Employment and Immigration Canada
Emploi et Immigration Canada

The Challenge of Technology Change in Canadian Municipalities

A Human Resource Study

Prepared by

The Coopers & Lybrand Consulting Group
Management Consultants

for

the Federation of Canadian Municipalities

and

the Canadian Occupational Projection System (COPS)

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ACKNOWLEDGEMENTS

The Federation of Canadian Municipalities (FCM) would like to acknowledge several Groups and individuals who have contributed to the success of this study.

First, the FCM would like to acknowledge the important role of the Minister of Employment and Immigration. Funding from Employment and Immigration allowed this study to go forward, and the participation of officials from the Research and Special Studies Division was important to the success of this project.

The FCM would also like to acknowledge the advice and support of members of the Steering Committee who carefully reviewed results at each stage of the project.

Finally, the FCM would like to thank the Coopers and Lybrand Consulting Group for their important role of undertaking the research for this project.

EXECUTIVE SUMMARY

This report is the result of a study sponsored by Employment and Immigration Canada, and the Federation of Canadian Municipalities, dealing with the issue of technological change and its impact on human resources employed in municipalities. The study used a variety of techniques to gather information including literature, expert interviews, focus groups and a mail survey of municipalities; the latter being the principal data source.

MUNICIPALITIES ARE TURNING TO TECHNOLOGY TO HELP THEM MEET NEW CHALLENGES

Municipalities are facing financial constraints and increasing demand for information and services. They are seeking ways to become more productive, efficient and financially effective, ard are looking to technology to provide some of the answers. Municipalities are generally not "leading-edge" organizations because they are accountable to the public and thus cannot assume the level of risk which comes with innovation. However, they have taken a cue from the private sector in terms of applying proven technologies to meet their needs. The key role for technology is to enable municipalities to do more with less resources.

In order to do this, technology is being applied throughout the scope of municipal functions, rather than just in centralized functions, resulting in a proliferation of micro-computer applications. To justify expenditures on technology, managers cite the perceived improvements in productivity, efficiency, and quality of work.

THE OFFICE AUTOMATION AND FINANCIAL SYSTEMS ARE THE MOST COMMON TECHNOLOGIES IN PLACE BUT THE FUTURE FOCUSES ON DESIGN TECHNOLOGIES

The first application of technology in municipalities focused on the

finance function. Since then the trend has moved away from centralized systems, to de-centralized applications which are compatible throughout the organization. Currently, the most common technologies focus on internal administration, such as word processing and electronic filing. Larger municipalities have adopted more sophisticated technology, such as local area networking to better meet their needs. The future trend in technology is the development of integrated corporate information systems. At the centre of this system is a data base which relates information to geographic location, resulting in more municipalities adopting computer mapping and other design technologies in the future.

SUPPORT OF MANAGEMENT AND COUNCIL, AND THE AVAILABILITY OF FUNDS ARE THE KEY FACTORS WHICH DETERMINE THE RATE OF ADOPTION

One of the most common and significant factors which determines the rate of technology adoption is the support of senior management. Technology adoption is mostly a top-down approach, therefore, commitment by senior managers is a critical factor in driving it forward. Key roles for senior management as seen by the survey respondents include, coordinating the adoption process and educating both council and middle management on the merits of technology.

Support of council is critical to the allocation of money for purchasing technology. The most common and significant impediment to the rate of technology adoption, according to the survey respondents, is the combination of the high cost of technology and the lack of funds.

TECHNOLOGY IS NOT EXPECTED TO RESULT IN EMPLOYMENT DECLINES; HOWEVER, IT IS EXPECTED TO OFFSET FUTURE HIRING

The impact of technology on employment levels is not expected to result in a sudden rationalization of municipal workers. However, it will dampen employment growth in the future, as one of the key justifications for technology is future hiring avoidance. Municipalities which find themselves with a surplus of employees after technology implementation

EXHIBIT A

SUMMARY OF "BEST PRACTICE"

- Develop and maintain a long-term strategic plan for the municipality, including a strategic information technology plan.

- Carry out a detailed needs assessment:

  - involve workers, middle management and senior management,

  - create a technology task force to assess needs,

  - work with the computer systems or management information systems group as technical advisors,

  - determine needs which can be met, and define projects and set priorities for implementation.

- Keep all staff, including unions, informed of new developments,

- Ensure good systems delivery practices, including appropriate project management and user involvement throughout the development process.

- Provide appropriate orientation and training courses to familiarize all levels of staff with the concept of technology and what it means to their jobs, and specific technology training at both the awareness and "hands on" training levels.

will most likely reduce employment through passive means, such as attrition and early retirement. Technology does have a positive impact on workers, in terms of increasing the scope of their job and their skill levels.

THE MOST CRITICAL STEP TO SUCCESSFUL IMPLEMENTATION IS PLANNING

Planning for technology should precede the actual implementation program. In the planning stage, a thorough needs and priorities assessment should be carried out, to determine what technology the municipality requires and what the municipality is trying to achieve. This is a process best suited to be part of a long-term strategic planning exercise. Key factors to assist the actual implementation of technology include: orientation of the employee towards technology, open channels of communication with the workers, a fair assessment of the time required for system development and testing. See Exhibit A, opposite, for a summary of "best practice".

TRAINING IS A KEY AREA OF IMPORTANCE

Training and education are very important in terms of orienting employees toward technology. Both "hands on" training on hardware and software, as well as general education on the role of technology and what it means to workers' jobs, are necessary to gain employee support for technology. Most municipalities offer basic training on the systems in place, but leave it up to the employee to learn the advanced applications.

CHAPTER I

THE PURPOSE OF THIS STUDY

EXHIBIT 1

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I. THE PURPOSE OF THIS STUDY

This report is the result of a study funded by the Canada Employment and Immigration Commission on behalf of the Federation of Canadian Municipalities, dealing with the issue of technological change and its impact on human resources employed in municipalities. The main objectives of the study were to:

- identify the types of technologies which municipalities have adopted and those which are likely to be adopted over the next several years;

- examine the impact of present and future technological change on employment levels, occupations, skill levels, training requirements, and job scope; and

- determine the effect that it will have on the provision of services at the municipal level.

A. THE SUCCESS OF THIS STUDY IS A RESULT OF THE HIGH LEVEL OF COOPERATION BY ALL PARTICIPANTS

We would like to take this opportunity to thank the Steering Committee members (see Exhibit 1, opposite) for their input into the study.

Special thanks are due to all the municipalities who participated in this study, as well as the people from other organizations who shared their knowledge with us. Confidentiality of all participants has been maintained, as no specific municipality has been identified in this report.

EXHIBIT 2

RELATIONSHIP BETWEEN RESEARCH ISSUES AND TECHNIQUES

RESEARCH ISSUES	RESEARCH TECHNIQUES				
	Literature Search	Expert Interviews	Case Studies	Mail-Out Survey	Discussion Group
What is the role of technology in helping municipalities provide efficient services?		●	●		●
What technologies are in place and how are they used?	●	●	●	●	●
What is the likely technology profile over the next 5-10 years?	●	●	●		●
What is the impact of technology on:					
- employment levels	●	●	●	●	●
- job content	●	●	●	●	●
- skill requirements	●	●	●	●	●
- expenditure levels		●	●	●	●
- part-time work		●	●	●	●
- contracting out services		●	●	●	●
- training/retraining requirements		●	●	●	●
How does management justify expenditure on new technology?		●	●	●	●
What are the factors that can impede the adoption of new technology?		●	●	●	●
What are the critical steps that ensure a smooth implementation process?	●	●	●	●	●
What is the role of various stakeholders in facilitating the adoption of new technology?		●	●	●	●

B. THE STUDY APPROACH INCORPORATED FIVE RESEARCH PHASES

The study approach centered on identifying the key research issues through preliminary research and then validating and analyzing the results through field research. A variety of research techniques were used. Exhibit 2, opposite, illustrates the relationship between the research issues and research techniques. Briefly the techniques used were:

- A literature search (See Appendix I for contact list and summary of results.)

- Expert interviews with municipal managers, provincial government officials and directors of associations across the country. (See Appendix II for a list of expert interviews and summary of results.)

- Case studies of five municipalities of various sizes in different regions of Canada to provide detailed information on what technologies are currently implemented and how they affect various occupations and services provided. (See Appendix III for a summary of the results.)

- A mail-out survey of 310 municipalities across Canada of which 183 responded (see Exhibit 3, over). (See Appendix IV for a detailed description of the survey sample.)

- Discussion groups of which, two were with management and one with workers, in different regions to provide an informal forum for discussing the preliminary results of the study as well as to reflect the opinions and concerns of the management and worker groups. (See Appendix V for the summary of the discussion groups.)

EXHIBIT 3

DISTRIBUTION OF SURVEY RESPONSE

	Population Size			Total
	Small	Medium	Large	
Canada total	530	78	33	641
Questionnaires sent out	199	78	33	310
Responses Received	119	44	20	183
- as per cent of total	22.5%	56.4	60.6	28.6
- as per cent of questionnaires sent out	59.8%	56.4	60.6	59.0

Note: Small = 5,000 to 49,999

Medium = 50,000 to 150,000

Large = Over 150,000

C. THIS REPORT SUMMARIZES THE STUDY'S KEY FINDINGS AND CONCLUSIONS

This report synthesizes the information and summarizes our findings. It is organized to provide an overview of the municipal sector up front and then deals with the specific issues identified through the research.

Chapter II provides a profile of the Canadian municipal sector in terms of numbers, size, and regional distribution. Employment trends are discussed, comparing population growth and employment growth in other sectors to the municipal sector, in general, and to the survey results, in particular. This section also briefly discusses occupation trends in municipalities. The purpose of this section is to inform the reader about the sector of the economy which is being analyzed and to illustrate the significance of the municipal sector in terms of size and economic contribution.

Chapter III discusses the challenges faced by municipalities and the role technology plays in dealing with those challenges.

In Chapter IV, the types of technology currently adopted, differences in technology adopted, by size of municipality, and future technology to be adopted, are presented.

Chapter V analyzes the impact of technology on municipalities, looking at the following factors:

- level of employment
- occupations
- skills
- training
- part-time work
- contracting-out services

- services provided
- level of expenditures
- health and safety issues.

It also discusses how municipalities deal with the impact of technology.

Chapter VI discusses those factors which drive technology and those which impede it, as well as the role for key stakeholders in facilitating the adaption of new technology.

In Chapter VII, the role of strategic planning in implementing new technology is analyzed, as well as how municipalities approach the planning process. This chapter also presents the critical success factors for a smooth implementation, as identified by the research.

CHAPTER II

MUNICIPALITIES REMAIN A MAJOR SECTOR IN THE CANADIAN ECONOMY ALTHOUGH THEIR RELATIVE IMPORTANCE HAS DECLINED IN RECENT YEARS

EXHIBIT 4

DISTRIBUTION OF CANADIAN MUNICIPALITIES BY SIZE AND REGION

	Population				
Regions	Less than 5,000	5,000-49,999	50,000-149,999	150,000 and over	Total
Atlantic	469	62	5	0	536
Quebec	1,292	149	17	4	1,462
Ontario	600	172	41	22	835
Prairies	1,226	76	2	5	1,309
British Columbia	87	68	13	2	170
Territories	69	3	0	0	72
Total	3,743	530	78	33	4,384

Note: This exhibit includes upper tier governments (regional governments, counties and metropolitan areas), and lower tier governments (cities, towns, villages and townships).

Source: Federation of Canadian Municipalities.

EXHIBIT 5

GROSS DOMESTIC PRODUCT

(billions 1981 $)

				Average Annual Per Cent Change		
	1971	1981	1986	1971-1981	1981-1986	1971-1986
Total Economy	214.9	319.5	364.5	4.0	2.7	3.6
Manufacturing Sector	44.8	61.6	71.1	3.2	2.9	3.1
Federal Government (excl. Defense)	5.1	6.8	7.3	2.9	1.4	2.4
Provincial Government	4.1	6.9	7.5	5.3	1.7	4.1
Municipal Government	3.5	5.2	5.6	4.0	1.5	3.2

Source: Statistics Canada

II. MUNICIPALITIES REMAIN A MAJOR SECTOR IN THE CANADIAN ECONOMY ALTHOUGH THEIR RELATIVE IMPORTANCE HAS DECLINED IN RECENT YEARS

This section briefly profiles the municipal government sector, providing analysis on overall employment and occupation trends as well as presenting the historical output and investment patterns for Canadian municipalities. It compares the municipal sector's performance against the Canadian economy as a whole.

A. THE MAJORITY OF CANADA'S POPULATION RESIDES IN 15% OF MUNICIPALITIES

There are over 4,300 municipalities in Canada. Over 85% of these have populations under 5,000, as shown in Exhibit 4, opposite. However, we estimate that approximately 75% of the Canadian population resides in the 15% of municipalities which have a population of over 5,000. This study focussed on this latter group.

B. MUNICIPALITIES COMPARE FAVOURABLY TO OTHER ECONOMIC SECTORS IN TERMS OF OUTPUT AND INVESTMENT

This section presents Statistics Canada data on the output and investment trends for the Canadian municipal sector between 1971 and 1987, and compares municipal performance to other sectors and the economy as a whole.

1. Growth in Output Has Slowed Since 1981

As seen in Exhibit 5, opposite, municipal government output, as defined by gross domestic product, reached $5.6 billion in 1986 (in constant 1981 dollars), up from $3.5 billion in 1971, exhibiting an average annual growth rate of 3.2% over the period. However, the growth was much stronger between 1971 and 1981, increasing 4.0% per annum. Average annual growth of local government GDP between 1981 and 1986 was only 1.5%, in constant 1981 dollars.

EXHIBIT 6

SHARE OF CAPITAL EXPENDITURE, IN CANADA ACCOUNTED FOR BY THE PUBLIC SECTOR

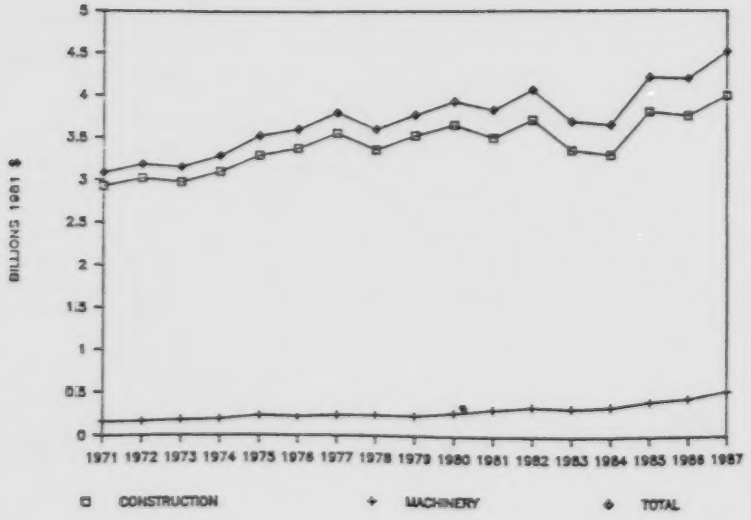
	1971	1981	1987*
Total Investment ($MM)			
Construction	$13,373.6	$ 56,882.2	$ 76,973.4
Machinery & Equipment	6,910.0	44,907.6	56,723.1
Total	20,283.6	101,789.8	133,696.5
Federal Government as a % of Total Investment			
Construction	2.6%	2.1%	2.9%
Machinery & Equipment	2.2	1.0	0.8
Total	2.5	1.6	2.0
Provincial Government as a % of Total Investment			
Construction	8.9%	5.4%	4.7%
Machinery & Equipment	0.7	2.0	1.9
Total	6.1	3.9	3.5
Municipal Government as a % of Total Investment			
Construction	8.0%	6.2%	6.4%
Machinery & Equipment	1.4	0.7	1.0
Total	5.8	3.8	4.1

* preliminary intentions

Source: Statistics Canada

EXHIBIT 7

LOCAL GOVERNMENT CAPITAL EXPENDITURE



Between 1971 to 1981 municipal GDP growth matched that of the economy as a whole and it exceeded both the manufacturing and federal government sectors. However, between 1981 and 1986 municipal GDP has exhibited slower growth than that of the economy as a whole and is lagging both the manufacturing and provincial government sectors.

2. Investment

The municipal sector's share of Canadian investment has declined since 1971, when it accounted for 5.8% of total investment. It dropped to 3.8% in 1981 and has since increased to 4.1% as indicated by preliminary 1987 data. Even with this relative decline, the municipal sector accounts for a greater share of total investment in both construction and machinery and equipment than does the federal government and exceeds the provincial government sector in construction expenditure. See Exhibit 6, opposite.

The Statistics Canada estimates for 1987 indicate that municipal investment will reach $4.5 billion (in constant 1981 dollars). Nearly 90% of this investment will be in construction, while the rest is allocated to machinery and equipment, as illustrated in Exhibit 7, opposite.

Investment (in constant 1981 dollars) in machinery and equipment has also been growing at a much stronger pace than construction. Between 1971 and 1987, the average annual growth rate for construction investment was 1.9%, while, at the same time, investment in machinery and equipment has been growing at an average annual rate of 7.8%. Between 1981 and 1987, the annual growth rate of machinery and equipment investment increased even faster at 8.2%.

EXHIBIT 8

COMPARISON OF EMPLOYMENT, POPULATION AND HOUSEHOLD TRENDS IN CANADA

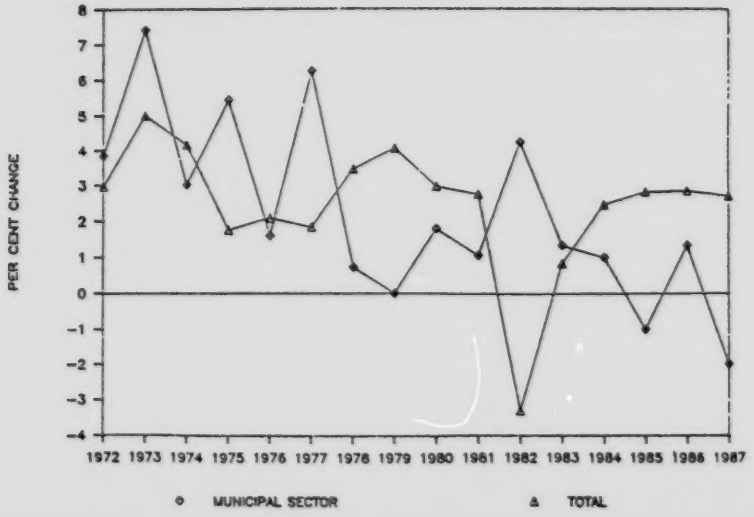
	1971	1981	1987	Average Annual Per Cent Change 1971-1981	Average Annual Per Cent Change 1981-1987
	000's			per cent	
EMPLOYMENT					
Total	8,104	11,006	11,949	3.1	1.4
Manufacturing Sector	1,766	2,122	2,044	1.9	(0.6)
Public Sector (excluding municipal sector)	337	486	518	3.7	1.1
Municipal Sector	208	282	296	3.1	0.8
POPULATION	21,568	24,342	25,480	1.2	0.8
HOUSEHOLDS*	6,041	8,282	n.a.	3.2	n.a.

* Includes family and non-family households
n.a. Not available

Source: Statistics Canada

EXHIBIT 9

EMPLOYMENT TRENDS



Part of this investment in machinery and equipment is related to technology. Although expenditures on new technology were not researched in this study, our previous work showed that approximately 25% of investment in machinery and equipment was related to new technology.

C. SPECIFIC OCCUPATIONS WILL EXPERIENCE GROWTH DESPITE STAGNANT EMPLOYMENT IN THE MUNICIPAL SECTOR

This section analyzes, at the aggregate level, the employment trends in the municipal sector, with comparisons to total Canadian employment and employment by sector, as well as population growth. This is followed by an analysis of the survey results on employment and population trends over the next five years, relative to the aggregate situation.

1. Employment in the Municipal Sector Has Lagged Total Employment Growth in Recent Years

Employment in the municipal sector matched total employment growth rates between 1971 and 1981, but lagged the growth in total employment between 1981 and 1987. See Exhibit 8, opposite. The growth of employment in the municipal sector also lagged employment growth in the public sector, overall. Between 1971 to 1981, employment numbers, in general, were growing more quickly than the population rate and slightly less than the rate of household establishments. However, since 1981, employment in the municipal sector has been growing at the same rate as the population, while employment in the manufacturing sector has declined.

The employment trends in the municipal sector have been inverse to total employment trends since the mid-1970's. The year-over-year changes in total employment and in municipal sector employment are illustrated in Exhibit 9, opposite, which indicates that municipalities have been slower to respond to economic pressures to reduce employment. However, since 1983,

EXHIBIT 10

OCCUPATION TRENDS IN LOCAL GOVERNMENT

Occupation	CCDO	1971	1981	Average Annual Per Cent Change
Social Services	23	3,300	7,660	8.7
Management and Administration	11	10,325	22,515	8.1
Natural Sciences Engineering and Mathematics	21	6,230	11,685	6.5
Clerical	41	24,295	37,990	4.6
Protective Services	61	46,635	69,655	4.1
Other	-	50,255	69,705	3.3
Total		141,040	219,210	4.5

Source: Statistics Canada, Census data.

municipalities have put a lid on employment increases and are now working to maintain or, in some cases, even reduce existing employment levels.

Employment in municipalities has also grown at a lower average annual rate than output by municipalities, indicating an increased level of productivity.

2. Most Municipalities Surveyed Expect Employment to Decline Between 1987 and 1992

For 1987 to 1992, municipalities surveyed in this study anticipate a decline in all employment categories, with the largest decreases in casual and full-time employment. The large municipalities expect to make the biggest cuts, particularly in casual, full-time and part-time employment. Meanwhile, the population in large municipalities is expected to remain stable in this time frame.

The most positive employment environment is expected to be in medium-sized municipalities, where only seasonal and casual employment is expected to decline, while modest growth is projected for part-time and full-time employment. However, population growth in medium-sized municipalities is expected to exceed employment growth for the 1987-1992 period. With employment in the manufacturing sector expected to decline in the future, the service sector, including municipalities will become a more significant employer.

3. Several Occupations Experienced Considerable Growth From 1971 to 1981

A brief profile of occupation trends in local government, is presented in Exhibit 10, opposite. The Canadian Classification and Dictionary of Occupations (CCDO) at the two-digit level refers to the major occupation groups, while at the four-digit level, it refers to specific occupations.

EXHIBIT 11

LIST OF SERVICES PROVIDED BY MUNICIPALITIES SURVEYED
(Per Cent)

		Population		
	Total	Small	Medium	Large
Roads and traffic	93%	91%	100%	100%
Planning and economic development	91	90	93	100
Parks and recreation	89	98	73	75
Buildings and inspection	85	92	77	65
Libraries	84	88	80	70
Water and sewer	84	91	66	85
Fire protection	83	95	66	55
Animal control	80	92	61	50
Garbage collection	74	85	57	55
Policy services	61	63	55	70
Transit	43	42	39	60
Care for the aged	37	32	41	60
Social assistance	33	25	39	65
Housing	27	24	23	55
Community health	23	13	27	75
Ambulance service	22	28	11	15
Day care	22	11	39	55
Social Assistance (Employment and housing)	15	10	11	50

Some of the specific occupations (at the four-digit level) which exhibited the strongest average annual growth and employed the most workers between 1971 and 1981 were:

- other protective service occupations (i.e. conservation officers, park attendants, life guards, snow controllers, 10.8%)
- government administrators (7.6%)
- welfare and community service workers (6.6%)
- bookkeepers (6.5%)
- outdoor nursery/garden workers (5.2%)
- secretaries (4.9%)

D. MUNICIPALITIES PROVIDE A WIDE VARIETY OF SERVICES

This section presents the services provided by municipalities as indicated by the survey results.

As shown in Exhibit 11, opposite, over 75% of all municipalities provide the following services:

- roads and traffic (93%)
- planning and development (91%)
- parks and recreation (89%)
- building and inspection (85%)
- libraries (84%)
- water and sewer (84%)
- fire protection (80%)
- animal control (80%)
- garbage collection (74%)

The profile of services offered varies by the size of municipalities. For example, fewer large municipalities provide fire, animal control and garbage collection services (50% to 55%) than smaller municipal corporations (85% to 92%).

The reason for these variations is that the larger category would have a fair number of upper tier governments and the responsibility for those services normally falls to lower tier governments.

Community health services, which were provided by only 23% of all municipalities, were much more common in large municipalities (75%) than in small (13%). This again is the result of the distribution of responsibility for services between municipalities (lower and upper tiers) and provinces.

Although the municipal sector has declined in its relative importance as measured by employment, GDP and investment, the sector remains an important segment of the Canadian economy.

CHAPTER III

MUNICIPALITIES ARE USING TECHNOLOGY TO MEET THE CHALLENGE OF IMPROVING PERFORMANCE UNDER RESTRAINT

III. MUNICIPALITIES ARE USING TECHNOLOGY TO MEET THE CHALLENGE OF IMPROVING PERFORMANCE UNDER RESTRAINT

This section highlights the key areas of concern for municipalities, what municipal management is doing to deal with these challenges, and the role of technology in assisting municipalities in achieving their goals.

A. MUNICIPALITIES ARE FACING A NUMBER OF SIGNIFICANT CHALLENGES

Municipalities are facing a number of significant challenges which ultimately require providing more services and information with the same or fewer resources. As the public becomes more sophisticated and the commercial base increases in some municipalities, the demand for information and services increases in terms of quantity, complexity and timeliness. Information requirements can stem from requesting the status of a bill payment over the phone to sophisticated socio-demographic profiles of neighbourhoods to computer-generated mapping. Municipalities are put under increasing pressure to meet their own and the public's needs for information without hiring additional staff.

Their only method of easing budget constraints is to raise taxes, but they are disinclined to do this since it erodes their competitive image as an attractive location for commercial investments, and also displeases their constituents. In addition, most municipalities are faced with the tremendous task of replacing/updating their infrastructure, which means that any extra capital they do raise may already be committed.

Municipalities are also expected to provide more precise and detailed financial analyses and to demonstrate value for money to their taxpayers, for example, by being able to show detailed accountability and unit costing for monies spent. This also places greater demands on the organization to provide this level of detailed information while still carrying out daily tasks.

To overcome these challenges, municipalities must become more productive and efficient in using their resources.

B. TECHNOLOGY HAS AN IMPORTANT ROLE IN HELPING MUNICIPALITIES MEET NEW CHALLENGES

Technology has a role in assisting municipalities deal with increasing workloads. Through the appropriate application of automation, municipalities can increase their productivity and efficiency by reallocating the workload from people to machines, and allowing employees to increase their value-added contribution, resulting in more output per employee.

Technology also makes new services feasible, for example, offering computer-generated socio-demographic profiles for a fee.

Accountability is also easier to achieve through automation since there is a better record of transactions. In addition, there are many programs which perform detailed cost breakdowns and allow for unit cost comparisons, (e.g., the cost per square foot of sidewalk laid, or cost per mile of road repairs).

The main role for technology is, and will continue to be, to assist municipalities in facing new challenges by allowing existing resources to be used more effectively to meet increasing demands.

C. PRODUCTIVITY AND EFFICIENCY ARE THE MAIN JUSTIFICATIONS FOR NEW TECHNOLOGY

One of the most significant findings, by omission, is that no one considers reducing employment as a justification for the adoption of technology. On the contrary, it is the positive impacts of implementing technology which were highlighted.

EXHIBIT 12

FACTORS WHICH DETERMINE THE NEED FOR NEW TECHNOLOGY

Factors	Total		Population Size					
			Small		Medium		Large	
	Percent	Av. Rank	Percent	Av. Rank	Percent	Av. Rank	Percent	Av. Rank
Increase Productivity	81	1.8	77	1.8	88	1.7	85	1.5
Increase Quality	54	2.1	53	2.1	57	2.1	55	1.9
Better Management Information	55	1.9	55	1.9	60	1.8	45	2.3
Public Demand	41	2.0	41	1.9	43	2.3	35	2.1
Lower Costs	35	2.1	39	2.0	21	2.4	45	2.4

Note: The per cent indicates the proportion of respondents, by category, which chose a factor either as 1, 2, or 3, in order of significance. The average ranking reflects the relative importance of each factor, as considered by the respondents. Therefore, the closer the average ranking is to 1.0, the more significance is attached to it by the municipalities. The closer to 3.0, the less significance.

1. Increased Productivity

The survey showed that the most common factors which are used to justify the need for technology are the perceived improvement to productivity and efficiency. As shown in Exhibit 12, opposite, 81% of all municipalities ranked increased productivity as one of the three most important factors in determining the need for technology. Large and medium municipalities considered improved productivity to be a more significant factor than did small municipalities.

Computer mapping illustrates a gain in productivity through the use of technology. One municipality estimated that revising its maps manually would take a number of years and would require additional resources. By using available technology, the municipality was able to maintain its current employment level and accomplished the task in much less time.

2. Improved Quality of Work

The second most common factor cited by the respondents was improved quality in the work performed, with 54% of the municipalities choosing this as one of the top three factors. Improved quality of work is important to municipalities as it promotes a more professional image to the public. Higher quality work also means fewer errors and thus increased productivity.

3. Improved Management Information

Improved access to management information as the basis of decision making was also considered a significant factor, with 55% of municipalities ranking it in the top three. Technology allows for more information to be processed more quickly and, thus, the decision makers (either elected officials or senior management) have more timely, accurate information on which to base their decisions.

4. Public Demand

Public demand, in terms of improved service delivery and access to information, was ranked as one of the three key factors by 41% of municipalities. Those municipalities which identified "public demand" as a major justification for technology generally rated it as the second most important factor, as reflected by the average ranking.

5. Cost Savings

Cost savings was fifth in terms of the percentage of municipalities ranking it in the top three, with a share of 35%. This may seem unusual, since municipalities are budget-conscious organizations, but it is perhaps less so when one considers that the adoption of technology may increase costs in the short term. Although technology, to some extent, shields a municipality from future hiring and its related costs, technology, in itself, is a costly proposition.

Municipalities are increasingly relying upon new technology as a means of meeting new demands, particularly in a tight fiscal environment. The major factors prompting the adoption of new technology are: a need to increase productivity and to improve the quality of work undertaken and management information provided.

Therefore, technology is not regarded as simply a low cost alternative, but a tool to assist a municipality to reach goals which are not realistic by other means. It is a way to increase the effectiveness of current resources and possibly defer increasing the number of employees to some future time. With municipalities faced with fiscal restraint and increasing demands for monies to be spent in areas other than human resources, technology is being used to alleviate some of the immediate pressures.

CHAPTER IV

MUNICIPALITIES HAVE A PRAGMATIC APPROACH TOWARDS TECHNOLOGIES THEY ADOPT

IV. MUNICIPALITIES HAVE A PRAGMATIC APPROACH TOWARDS TECHNOLOGIES THEY ADOPT

Municipalities are more directly in the public eye than any other level of government. Due to the need to demonstrate accountability, municipal corporations prefer proven methods, rather than experimentation, in the adoption of new technology. The evolution of technology use in municipalities is generally based on objective-driven needs and justification, rather than on a desire for innovation or for technology-driven reasons. In short, municipalities are technology followers, not leaders, in part because they are risk-avoiding institutions.

The most commonly adopted technologies in municipalities are those which are likely to show the greatest benefit with the least associated cost. The future of technology adoption in municipalities revolves around integrating existing technology, adding on new technology as it becomes feasible and applying it on a corporate basis to improve management information and service delivery.

A. TECHNOLOGY USE IN MUNICIPALITIES EVOLVED FROM THE FINANCE FUNCTION

In most municipalities, the finance/accounting functions were the first to be automated. Throughout the late 1960's and 1970's, municipalities concentrated on centralized, batch processing, computer systems, under the jurisdiction of the finance or treasury department. This was a logical step as the financial area is essential to municipal operations and it is also the most adaptable to technology due to the large volumes of numerical data involved.

The computer support group, including systems development, user support and hardware maintenance, typically evolved within the finance area. This arrangement was satisfactory for a period of years until the late 1970's, when other departments began demanding computer-time and support.

More recently, three factors have influenced the trend away from centralized main-frame technology:

- the introduction of the micro (personal computer),
- the increasing availability of user friendly software, and
- the decrease in the cost of new technology.

These three factors have assisted municipalities in moving from centralized systems, which focus strictly on the accounting functions, toward a centralized data base with decentralized applications.

There is also a distinction between corporate and departmental technology within municipalities. Certain technological applications, such as word processing, are common to all departments. These applications are part of the corporate systems which should be compatible across all departments. Other applications are department/function-specific and may be relevant to only one department's needs. The goal of most municipalities is to operate an integrated corporate system for the flow of information between departments, with certain localized systems for specific departments to manipulate information for their own needs.

In one municipality, this point was illustrated when one department was allowed to purchase micro-computers that were not compatible with the rest of the organization. The department had specific needs, such as sophisticated graphics capability and user friendliness which justified the departure from corporate standards.

EXHIBIT 13

TECHNOLOGY CURRENTLY IN PLACE

	Total	Population Size		
		Small	Medium (per cent)	Large
OFFICE AUTOMATION SYSTEMS				
Word Processing	86%	82%	93%	100%
Electronic Data Bases	65	61	61	95
Decentralized Information Systems	36	26	48	70
Electronic Filing	17	13	16	45
Local Area Network	16	8	23	55
TELECOMMUNICATION TECHNOLOGIES				
Private Automatic Branch Exchange	28	24	32	40
Facsimile Transmission	19	12	23	55
DESIGN TECHNOLOGIES				
Computer-Aided Mapping	15	7	25	45
Computer-Aided Engineering	11	5	18	30
Computer-Aided Project Management	13	4	20	45
SERVICE DELIVERY TECHNOLOGIES				
Computerized Inventory System	23	12	43	50
Direct Data Entry From Field	18	14	23	30

B. MUNICIPALITIES MOST COMMONLY ADOPT PROVEN TECHNOLOGIES IN THE AREA OF OFFICE AUTOMATION

According to the research, the most common technologies currently in place in municipalities relate to office automation applications. As shown in Exhibit 13, opposite, 86% of municipalities responding to the survey had word processing capability, a feature of all sizes of municipality.

Also common are electronic data bases, which 65% of municipalities employ. This refers to the electronic storage and retrieval of data, either on a corporate or departmental basis. When analyzing this by size of municipality, it is much more common in large organizations (95%) than in small or medium ones (61% for both).

Other office applications such as decentralized information systems, electronic filing and local area networks, are far more common in large municipalities. For example, 55% of large municipalities indicated that they have local area networks, while only 8% of small municipalities have them. The key reasons for this are cost and relevance. Larger organizations generally have numerous terminals which can be connected, whereas smaller organizations may have only two or three terminals.

The most common telecommunication technologies are a private automatic branch exchange and facsimile transmission machines, with 28% and 19% of respondents, respectively, indicating that they have them in place. These technologies are also considerably more common in the large municipalities than in medium and small ones.

Design technologies are fairly uncommon among all municipalities, with only 11% to 15% having computer-aided engineering, mapping and project management systems in place. Fewer than 10% of small municipalities have the above mentioned applications. This

increases to 25% for medium municipalities, while nearly one-third to one-half of large municipalities have some type of design technology.

The same pattern appears with service delivery technologies, as they are least common in small municipalities and most common in the large ones.

Overall, large municipalities are the technology leaders in the number of applications currently in place. This is a factor of financial ability to purchase the technology, availability of skills to implement it, and a bigger volume and complexity of work to manage, resulting in a greater need for automation. Of large municipalities, 30% have in place all the technologies listed in Exhibit 13.

Small and medium-sized municipalities are implementing those applications, such as office automation and financial systems, which will have the greatest impact on their organization. Larger municipalities have generally already adopted these systems, and are now pursuing more sophisticated technologies, particularly those which can assist them in making decisions.

C. THE FUTURE OF TECHNOLOGY IN MUNICIPALITIES REVOLVES AROUND INTEGRATED CORPORATE INFORMATION SYSTEMS

In the case-studies and expert interviews, the findings show that most municipalities are moving to an integrated corporate information system. This system usually revolves around geographic-based data which can be used by different departments to meet their various needs. The technologies most relevant to creating such a system fall into the design group such as computer-aided mapping, engineering, project management and design. All forms of data, ranging from social welfare statistics to

EXHIBIT 14

TECHNOLOGIES MUNICIPALITIES ARE LIKELY TO HAVE IN PLACE BY 1992
(per cent)

	Currently in Place	Likely to Adopt	Total
OFFICE AUTOMATION SYSTEMS			
Word Processing	86%	11%	97%
Electronic Data Bases	65	17	82
Electronic Filing	17	41	58
Decentralized Information Systems	36	21	57
Local Area Network	16	27	43
TELECOMMUNICATION TECHNOLOGIES			
Facsimile Transmission	19	33	52
Private Automatic Branch Exchange	28	13	41
Electronic Mail	0	22	22
Voice Mail	0	12	12
Video Conferencing	1	9	10
DESIGN TECHNOLOGIES			
Computer-Aided Mapping	15	48	63
Computer-Aided Engineering	11	44	55
Computer-Aided Project Management	13	40	53
Computer-Aided Design	0	36	36
SERVICE DELIVERY TECHNOLOGIES			
Computerized Inventory System	23	47	70
Direct Data Entry From Field	18	18	36
Electronic Processing of Service Requests	7	18	25
Public Access to Data	4	21	25
Electronic Service Delivery	2	8	10

long-range community planning, can be incorporated into a geo-base system, and analyzed relative to a location in the municipality. There are many uses for geo-base systems, as illustrated by the following examples:

- In one municipality, one of the major banks was trying to determine a location for a new branch. The bank wanted to know what approach was needed to gain some competitive advantage. The municipality provided the bank with socio-demographic data on the area which detailed the residential/commercial mix, income levels, presence of ethnic groups, and so on. The bank could then make informed decisions on the focus of its operations (residential vs. commercial) and provide staff fluent in the languages of its customers.

- In the planning function, computer-aided mapping and design can illustrate the impact new developments will have on shade and wind effects, as well as on the use of roads and the municipal infrastructure.

- Scheduling and routing are other services which can be improved through geo-base data systems. One small municipality avoided the costs of purchasing an additional garbage truck and hiring more staff when a new, more efficient route was selected with the use of a geo-base system.

A significant number of municipalities expect to adopt design technologies over the next five years (see Exhibit 14, opposite). Adding together the proportion of municipalities which have design technologies in place, and those which are likely to adopt them, 75% of large municipalities will have computer-aided mapping, engineering and project management in five years. Nearly half the small municipalities indicate the likelihood of adopting some sort of design technology within five years.

The next most significant area for future technology adoption is in service delivery, particularly with the medium and large municipalities. One of the key reasons for improving service delivery is to satisfy public demand. By providing the public with the required information and timely service, fewer complaints are registered. The public has also come to expect a level of service and technology convenience similar to that of the private sector, thus pushing municipalities to seek better ways to deliver service. Finally, improved service delivery can enhance the competitive image of a municipality in terms of attracting new commercial/industrial and residential development.

Public works departments, which provide a wide variety of services to the public -- from snow removal, to repairing roads and pruning trees -- receive many telephone calls, both complaints and requests. One municipality, in trying to improve its level of service to the public, installed a call-tracking and status report system. All calls to public works come into one main number, where the call is logged onto the system. Then the message (request for service) is electronically forwarded to the appropriate department or compound. The system also provides status reports on each call so that it can easily be determined whether or not the required service has been delivered.

Internal telecommunications will also be receiving attention in the future. Although electronic and voice mail technology are not currently used by municipalities responding to the survey, over the next five years, 22% of municipalities expect to adopt electronic mail and 12% expect to adopt voice mail.

Office automation technologies are expected to continue to increase their presence in municipal operations in the future.

Although the use of new technologies in the municipal sector has generally lagged the private sector and provincial/federal governments, municipal use of technology has changed dramatically, particularly in recent years. The evolution of technology use by municipalities has followed the major epochs in new technology development over the past twenty years. Generally, larger municipalities are the technology leaders, with smaller municipal corporations following once the application and its utility have been proven.

CHAPTER V

THE IMPACTS OF TECHNOLOGY ON EMPLOYMENT CONTRADICT SOME CONVENTIONAL WISDOMS

EXHIBIT 15

CURRENT AND FUTURE DEGREE OF IMPACT OF TECHNOLOGY
(per cent)

	Total		Population Size					
			Small		Medium		Large	
	Current	Future	Current	Future	Current	Future	Current	Future
Major Impact	15%	17%	14%	16%	16%	17%	16%	28%
Moderate Impact	36	40	31	37	40	44	63	56
Slight Impact	32	29	37	31	23	27	21	17
Very Little Impact	17	14	18	17	21	12	-	-

V. THE IMPACTS OF TECHNOLOGY ON EMPLOYMENT CONTRADICT SOME CONVENTIONAL WISDOMS

Contrary to popular belief, the findings of this study indicate that technology has a positive, although moderate, impact on municipal employment. This chapter discusses the effects of technology on employment levels, skill requirements and how municipalities deal with skill shortages and surpluses.

A. THE EFFECT OF TECHNOLOGY ON VARIOUS ASPECTS OF EMPLOYMENT ARE MODERATE

The survey shows that the overall effect of technology on municipal government employees is considered moderate to slight by most respondents. As shown in Exhibit 15, opposite, 36% of respondents indicated that the impact on employment to date has been **"moderate"**, with 40% believing that the impact will also be **"moderate"** in the future. Nearly one-third of the municipalities indicated that technology has had only a **"slight"** effect on employment and just under 30% believe it will have a **"slight"** impact in the future.

Exhibit 16, over, illustrates some of the specific factors affected by technology. The signs in the table represent the answer given by the majority of respondents. As can be seen, the effects of technology are fairly consistent across all size categories.

- Number of Employees

  One of the most prevalent views regarding technology is that it will result in lay-offs, as machines take over for people. The study findings disprove this theory to a large extent. According to the majority of the respondents, technology has had no impact on the number of employees and that is not likely to change in the future. Technology's greatest effect on the level of municipal employment is that it may postpone future hiring as it assists in increasing the productivity of existing

EXHIBIT 16

SPECIFIC IMPACT OF TECHNOLOGY ON HUMAN RESOURCES

Factors Impacted on by Technology	Total		Population Size					
			Small		Medium		Large	
	Past	Future	Past	Future	Past	Future	Past	Future
Number of Employees	0	0	0	0	0	0	0	0
Scope of Work	+	+	+	+	+	+	+	+
Number of Part-Time Employees	0	0	0	0	0	0	0	0
Skill Level for Current Employees	+	+	+	+	+	+	+	+
Skill Level for New Employees	+	+	+	+	+	+	+	+
Training and Retraining	+	+	+	+	+	+	+	+

\+ increase
\- decrease
0 no effect

employees. In some cases, the implementation of technology results in an increase in the employment levels. In the initial stages of technology adoption, the changeover from manual systems to automated systems is labour intensive and existing staff may become over extended. Also, technology allows more information to be generated, and new information leads to new ideas and the creation of new projects. Often, new staff are hired to keep up with the expanded demand for information.

- Scope of Work

  All municipalities feel that technology has increased, and will continue to increase, the scope of work for most employees. Technology encourages workers to look beyond their own job function in order to understand where their inputs are coming from and where their outputs are going. Technology also assumes much of the "drudge" work, allowing the worker to become more of a "value-added" resource.

- Part-Time Employment

  A large number of municipalities (75% to 80%) indicated that technology has little or no effect on the number of part-time employees. However, some problems do arise from technology, in respect to part-time work. Many municipalities have had to restructure their system of hiring part-time or temporary workers because of technology. In order to make a contribution, the part-time worker must be familiar with the type of technology a municipality has in place, otherwise a good portion of their time there will be spent on learning the new system. To deal with this problem, many municipalities have created a permanent part-time pool of operators who are familiar with their system.

EXHIBIT 17

IMPACT OF TECHNOLOGY ON SKILL LEVELS

		Population Size		
	Total	Small	Medium	Large
Basic Skills (Reading, Writing)	0, +	0, +	0, +	0, +
Analytical Skills	+	+	+	+
Communication Skills	+, 0	+, 0	+, 0	0, +
Technical Skills (Manual, Craftsmanship)	+	+	+	+
Cognitive Skills	+	+	+	+

\+ increase
\- decrease
0 no impact

Note: When 2 symbols appear together it indicates the response was split, fairly evenly, between two impacts. The leading symbol represents the more significant of the two responses.

- Skill Level

  The skill level for both current and new employees has increased as a result of new technology and will further increase in the future. The impact of technology on skill levels will be discussed in more detail in the following section.

- Training

  Municipalities expect to offer more training and retraining in response to new technology. Current employees have to be retrained with the skills required by new technology. Others, with obsolete skills, have to be retrained in new areas of work. New hires usually require some training, as well, to familiarize them with the specific hardware and software used by the municipality. (A more detailed discussion of training availability and type is found in Chapter VII.)

In summary, technology is generally seen as having little impact on the actual number of full-time and part-time positions. However, technology does have a beneficial effect on the structure of existing employment, in terms of expanding the scope of jobs and increasing the level of skills required.

B. TECHNOLOGY RESULTS IN IMPROVED SKILL LEVELS

Another anticipated impact of technology is the notion of de-skilling, having employees become simple automatons rather than thinking human beings. However, this study indicates that the overall impact of technology on skill levels is to require a higher skill set from municipal workers. Exhibit 17, opposite, illustrates the impact of technology on specific types of skills, as indicated by the majority of the respondents to the survey.

- Reading and Writing

  According to the survey results, it is debatable whether technology requires increased reading and writing skills (basic) or has no effect on them at all.

  The findings from other research phases show that technology requires a fairly high level of basic skills in some applications but, in others, has fairly little impact. For example, a simple data entry job may not require any better reading and writing skills than did a previous position. However, in those cases where technology is being used by labourers, then there was a significant impact on basic skills. Prior to implementing technology, the basic skill qualifications for labour were very low. Most did not have a high school education and their reading and writing skills were weak. The use of technology at this level has necessitated a higher literacy level, and a grade 12 education has become mandatory in some municipalities.

  One example of technology used at this level is facsimile transmission by a public works department. The department had a number of compounds across the city, each outfitted with a "fax" machine. Questions which arose between compound could be addressed over the phone, and if a diagram or written order was needed, it could be sent by fax. The workers had to learn to use the machine, as well as improve their writing and reading skills, in order to transmit information.

- Analytical Skills

  Over three-quarters of all respondents indicated that technology requires increased analytical skills. Since one of the main functions of technology is to carry out low level tasks of data manipulation, it frees the employee from spending the majority of his/her time on "drudge" work. The

responsibility of the worker then changes from simple "number crunching" to analyzing the information provided through technology.

- Communication Skills

  There is, however, some disagreement over whether technology increases the level of communication skills or has no effect at all. Slightly more of the small and medium municipalities believe that technology increases interpersonal skills while the reverse is true for large municipalities. This may, in part, be explained by more specialized tasks and finer division of labour in larger municipalities. The communication skill will no doubt vary by the function performed and type of technology used by the employee. For example, electronic mail will require a higher level of writing skills from all those sending internal memos as there is less time to retrieve the document to make changes.

- Technical Skills

  More than half of all respondents indicated that technology results in a higher level of technical skills. This is particularly true of manual skills, as many employees become adept at using a keyboard.

- Cognitive Skills

  Cognitive skills (knowledge of process) are also expected to increase. Technology, as mentioned earlier, increases the scope of most jobs. Therefore, employees become more familiar with functions outside their own area. The move towards integrated systems throughout the municipality allows employees to get a better cross-departmental overview of how the municipality operates. Although an increased level of cognitive skills may not be applicable to any specific employee

EXHIBIT 18

IMPACT OF TECHNOLOGY ON SPECIFIC OCCUPATIONS
(per cent)

	Degree of Impact			
	Major	Moderate	Slight	Little or None
PROFESSIONAL OCCUPATIONS				
Administrators and Managers	37	51	10	2
Engineers	47	37	14	3
Accountants	58	31	8	3
Draftsmen	40	38	14	7
Systems Analysts & Computer Programmers	61	26	4	9
Surveyors	25	36	25	14
Inspectors and Regulatory Officers	14	47	26	13
ADMINISTRATIVE OCCUPATIONS				
Secretaries	41	43	13	3
Clerks	34	48	16	2
Bookkeepers	43	41	11	4
SERVICE OCCUPATIONS				
Social Workers	6	29	38	27
Firefighters	7	33	35	25
Policemen	19	38	27	16
Dispatchers	24	39	20	17
Guards and Watchmen	1	17	30	51
Janitors	0	7	18	76
Public Transit Drivers	2	13	35	50
Ambulance Drivers	6	26	33	35

function, it does create a more knowledgeable and, thus, more valuable employee.

C. THE DEGREE OF TECHNOLOGY IMPACT VARIES BY OCCUPATION

This section briefly discusses the impact of technology on specific occupations.

1. Impact on Occupations

On average, nearly 80% of the survey respondents believe that technology is likely to have a major or moderate impact on professional occupations. (See Exhibit 18, opposite). Most municipalities expect that accountants, managers, computer specialists and engineers will experience at least a "moderate" level of impact.

Administrative occupations such as secretaries, clerks and bookkeepers are expected to experience a "major" or "moderate" change. These occupations are usually in the front-line of technology use. They are involved in those areas where the municipality first implements widespread technology-related innovations (i.e., office automation and financial systems).

Few municipalities expect service occupations to be affected to any great extent by technology. In most cases, the likely effect will be "moderate" or "slight" and, for some occupations such as guards, janitors and public transit drivers, a majority of municipalities expect the impacts to be little or none.

2. Availability of Skills

For those occupations where technology is expected to have a major or moderate impact, (refer to Exhibit 18) the survey

EXHIBIT 19

AVAILABILITY OF EMPLOYEES WITH APPROPRIATE SKILLS AFTER THE ADOPTION OF NEW TECHNOLOGY
(per cent)

	Increase	Decrease
PROFESSIONAL OCCUPATIONS		
Administrators and Managers	47%	53%
Engineers	52	48
Accountants	64	36
Surveyors	49	51
Draftsmen	52	48
ADMINISTRATIVE OCCUPATIONS		
Secretaries	73	27
Clerical Staff	67	30
Bookkeepers	68	32
SERVICE OCCUPATIONS		
Social Workers	59	41
Firefighters	56	44
Policemen	56	44
Dispatches	56	44

participants were asked to indicate whether there would be more or less employees available with the appropriate technology-related skills.

In the professional occupations category, there was no consensus on whether there would be an increase or decrease in the availability of technology-related skills. (See Exhibit 19, opposite.)

In the case of administrative staff, the availability of employees with the necessary skills is expected to increase in most municipalities. In the service occupations group, slightly more than half of the respondents indicated that there would be more skilled people available in those occupations where technology is expected to have the greatest impact.

3. Impact by Job Level and Age

The effect of technology by job level is set out in Exhibit 20, over, which shows that the senior levels are more likely to be significantly affected by technology. Lower job levels are seen as not being affected by technology by nearly 60% of the respondents, while middle management was thought to be somewhat affected by technology, according to 67% of respondents.

- Labourers and Workers

  At the lower job levels, labourers comprise the largest portion of the employee group, employed mostly in the public works departments. Technology has not yet penetrated the public works area, outside the office, to any significant degree. Labourers, therefore, have little exposure to technology. In some municipalities this is changing, as more advanced machinery is being purchased, scheduling and tracking programs are being implemented, as

EXHIBIT 20

EFFECTS OF TECHNOLOGY BY JOB LEVEL AND AGE GROUP
(per cent)

	Significantly Affected	Somewhat Affected	Not Affected
JOB LEVEL			
Labourers and Workers	6%	35%	59%
Supervisors or Foreman	17	67	16
Managers	55	40	5
AGE GROUP			
Less than 25 years	20%	54%	27%
25 to 44 years	36	59	4
45 to 54 years	39	51	10
55 and over	35	41	35

well as the use of more sophisticated telecommunication technology. In the future, the impact, on this level of municipal employee, is likely to change significantly.

- Supervisors

  Supervisors and foremen will be somewhat affected by technology since, although they may or may not be direct users, they are recipients of technology-generated output. They have to be familiar with the capabilities of the technology and have better cognitive skills to appreciate its role in the process for which they are responsible. In some ways, this is the group which has to adjust the most to the implementation of technology. This group of employees most likely worked their way up to their positions and have little in the way of educational background or personal experience to prepare them for technology-related change. Yet, this group has to be knowledgeable of all the functions and processes which are automated in their area of responsibility.

- Managers

  Managers are thought to be most affected by technology since they feel the impact at two levels. First, technology enhances management's decision-making capabilities by providing timely information to the manager on his/her own area of responsibility, and on the organization overall. Secondly, many managers are becoming direct users of technology with a computer terminal at their disposal. They can carry out "hands-on" work which would be too time consuming and inefficient for them to do without technology.

EXHIBIT 21

INCIDENCE OF CONTRACTING-OUT SERVICES
(per cent)

		Population Size		
	Total	Small	Medium	Large
Contract Out Work	85%	86%	77%	89%
Do Not Contract Out Work	15	14	23	11

- Age

  The response to the impact, by age group, does not make a strong statement, but generally indicates that all age groups are somewhat affected. Comments on the relationship between technology and the age of employees by the various municipalities interviewed indicate that older employees have a harder time adapting to change. However, once they discover what technology can do for their work performance, they are generally enthusiastic.

D. THERE IS NO CLEAR RELATIONSHIP BETWEEN CONTRACTING OUT WORK AND TECHNOLOGY

Most municipalities (85%) surveyed contract out for some type of service. Large and small municipalities are more likely to contract out work than medium size municipalities (see Exhibit 21, opposite).

One of the preliminary hypotheses of this study was that there is a relationship between contracting out work and technology. The research has found no such relationship. Although municipalities do contract work out, very little of it has any relationship to technology. The one exception is in the area of systems development where, due to the level of expertise required and the cost of hiring that expertise, many municipalities use private sector companies. Otherwise, municipalities generally contract out work where they can achieve cost savings or do not have the need for full-time resources.

E. IMPACTS OF TECHNOLOGY ON AREAS OUTSIDE OF EMPLOYMENT ISSUES VARY

The other impacts of technology dealt with in the survey were:

- level of service,

EXHIBIT 22

OTHER IMPACTS OF TECHNOLOGY

	Total		Population Size					
			Small		Medium		Large	
	Current	Future	Current	Future	Current	Future	Current	Future
Level of Service	+	+	+	+	+	+	+	+
Expenditure Levels	+, 0	+, 0	+, 0	+, 0	+, 0	+, 0	+, 0	+, 0
Health and Safety Conditions	0	0	0	0	0	0	0	0

\+ increase
\- decrease
0 no effect

Note: When 2 symbols appear together, it means the response was split, fairly evenly, between two possible impacts. The leading symbol represents the more significant of the two responses.

- level of expenditures, and
- the health and safety environment.

Other comments on the impact of technology in these areas come from the expert interviews, case studies and discussion groups.

1. Level of Service

A large majority of municipalities believe that technology has and will continue to improve the level of service which they provide to the public (see Exhibit 22, opposite). Technology helps to improve service levels in two ways. The direct impacts are apparent in the areas where municipal staff have direct dealings with the public. For example, automated facilities booking systems allow for immediate confirmation and less chance of mix-ups when reservations for the municipality's facilities are made. Another area where direct and immediate improvement can be seen is automated billings, where the bill payer can call and receive an immediate status report on his payments. There are many other applications which a municipality can implement to improve its level of service to the public. These include:

- Telephone call tracking system which provides information on the status of complaints or requests for information from the municipality.

- Public access to municipal data bases.

- Computer-aided dispatch which improves the response time for emergency services.

Technology's other benefit for the level of service is indirect in nature. By implementing new technology and thus improving productivity and efficiency, and becoming more financially

effective, the municipality can become a better managed organization, with indirect benefits accruing to the public.

2. Level of Expenditure

There is a mixed opinion on the impact of technology on expenditure levels, with a significant share of the respondents indicating that expenditure levels either increased or were not affected at all. The responses were also fairly consistent across all size categories. These answers reflect the different rates at which municipalities are adopting new technology, the difference in levels of technology to be achieved, and the relative wealth of various municipalities.

The more complex and widespread a technology implementation is, the more costly it becomes. Municipalities which are pursuing high-level technology generally create specific, and fairly substantial, long-term budgets to cover the costs. In this case, there will be a significant effect on expenditures. In simpler or more localized applications of technology, such as purchasing word processing computer terminals for a department, the impact on overall expenditures will be minimal, especially if fewer staff are required.

3. Health and Safety Environment

Most municipal managers feel that technology has no impact on the health and safety environment, nor do they expect that it will. Therefore little attention is paid to this area. Some municipalities have completed ergonomic studies and have had health inspections as a result of implementing technology. Generally, however, most municipalities deal with this issue on a day-to-day basis. If individual complaints do arise, they are dealt with, but most municipalities do not have formal policies in place.

EXHIBIT 23

STEPS TO REDUCE EMPLOYMENT IN CASE OF SURPLUS
(per cent)

	Very Likely	Somewhat Likely	Not Very Likely	Not Likely At All
Attrition	71	16	5	8
Retraining	33	49	8	10
Early Retirement	30	38	19	13
Lateral Transfer	17	44	16	23
Increase Part-time and Decrease Full-time Staff	6	37	37	20
Job Sharing	4	30	39	27
Lay-offs	5	22	45	28
Relocation	2	5	17	76
Shorter Work Week	1	19	38	42

Workers tend to have more concerns in this area. In one municipality, workers, who were concerned about VDT radiation, were given a lead vest to wear which was both heavy and cumbersome. Most complaints focus on ergonomic issues, such as back pain from improper chairs and desk height, eye problems stemming from screen glare and concern over radiation. Relevant literature reviewed suggests that the introduction of technology may cause higher stress levels among workers before they get acclimatized to the change.

F. MUNICIPALITIES GENERALLY HAVE A PASSIVE APPROACH TOWARD HUMAN RESOURCE MANAGEMENT IN DEALING WITH THE IMPACT OF TECHNOLOGY

This section discusses how municipalities deal with specific impacts of technology such as skill shortages and surpluses and the organization of work. The general findings show that municipalities are not likely to use aggressive actions, such as lay-offs in times of surplus, nor recruiting in times of shortage. Their approach is more passive, using available resources, retraining when necessary, and letting time take care of surplus employment, through attrition and early retirement.

1. Skill Surpluses

One of the possible impacts of implementing new technology is a surplus of skills (employees) in a particular function. Exhibit 23, opposite, summarizes the steps municipalities are likely to take to reduce surplus employment. Unlike the private sector, where lay-offs are a common method of downsizing, few municipalities feel that that is an option available to them. Municipalities prefer to take passive steps which preserve current employees' job.

The survey showed that the two most likely ways of reducing employment are attrition and early retirement. Retraining

EXHIBIT 24

STEPS TO REDUCE EMPLOYMENT IN CASE OF SHORTAGE
(per cent)

	Very Likely	Somewhat Likely	Not Very Likely	Not Likely At All
Upgrade Skills	71%	27%	1%	1%
Re-Training	53	39	3	5
Recruiting and Hiring	35	32	25	9

staff to work in other areas was also indicated as likely by over 80% of the respondents. Lateral transfers, increasing the proportion of part-time workers, and implementing job sharing, were considered "somewhat likely".

2. Skill Shortages

Most municipalities (71%) have not experienced any shortages of qualified staff as a result of new technology. This statement is, however, more applicable for small municipalities (75%) than large municipalities (50%), because larger municipalities generally have a greater demand for personnel skilled in technology applications. If municipalities did, however, experience a shortage of skills, the most likely step they would take to alleviate this problem is to upgrade the skills of existing employees (see Exhibit 24, opposite). Retraining staff completely, from one function to another, was the next most likely step. The third most likely was to resort to outside hiring. Most municipalities will, however, consider this step only if they cannot come up with an internal resource. It is also more common for large and medium size municipalities to hire employees than small municipalities. One of the reasons for this is that the large municipalities usually have better access to a skilled work force and more financial resources to attract skilled personnel.

3. Organization of Work

In order to effectively incorporate technology, some organizational changes to work processes usually have to be made. As technology takes over more of the manual, time-consuming tasks, employee effort has to be applied differently to take advantage of the new level of efficiency. However, most municipalities are still in the early stages of implementing technology and have not reached the stage where they can evaluate the full impacts and make suitable

organizational changes. Some of the changes made by municipalities to this point are:

- Re-assignment of job classification and responsibility.
- Consolidating offices, re-organizing departments.
- Redefining manual processes.
- Re-routing the flow of work.

All these actions are geared to improving the municipality's performance as it adapts to technology. Some municipalities have indicated that, once they have achieved specific milestones in implementing technology, they will assess the organization of the work processes, in the municipality, and make major changes, if necessary.

CHAPTER VI

THE RATE OF TECHNOLOGY ADOPTION DEPENDS ON THE COMMITMENT OF SENIOR MANAGEMENT AND THE AVAILABILITY OF FINANCING

EXHIBIT 25

FACTORS WHICH DRIVE THE RATE OF TECHNOLOGY ADOPTION

Factors	Population Size							
	Total		Small		Medium		Large	
	%	Av. Rank	%	Av. Rank	%	Av. Rank	%	Av. Rank
Commitment of Management	72	1.7	63	1.8	81	1.7	100	1.6
Support of Council	83	1.9	81	1.9	93	1.9	75	1.8
Availability of Funds	59	2.1	63	2.1	49	2.1	50	2.3
Identifiable Benefits	52	2.1	55	2.0	44	2.1	50	2.2

Note: The per cent indicates the proportion of respondents, by category, which chose a factor as either 1, 2 or 3, in order of significance. The average ranking reflects the relative importance of each factor, as considered by the respondents. Therefore, the closer the average ranking is to 1.0, the more significance is attached to it by the municipalities. The closer to 3.0, less significance is attached.

VI. THE RATE OF TECHNOLOGY ADOPTION DEPENDS ON THE COMMITMENT OF SENIOR MANAGEMENT AND THE AVAILABILITY OF FINANCING

This chapter of the report discusses those factors which are perceived to drive or impede the rate at which new technology is implemented. The study findings indicate that the two most significant factors which affect the rate of its adoption are the disposition of senior management toward technology and its affordability.

A. COMMITMENT BY SENIOR MANAGEMENT IS A KEY FACTOR IN ASSISTING TECHNOLOGY ADOPTION

There are a number of critical factors which help drive the rate at which technology is adopted by a municipality. The absence of one or two of these key inputs could impede or bring to a halt any plans a municipality may have in the direction of implementing new technology. One of the most important factors which will assist the whole process of obtaining and implementing new systems is the support of senior management for the concept.

1. Commitment by Senior Management

"Commitment by management" for technology was indicated by 72% of the municipalities in the survey as one of the three most common factors in the adoption rate (see Exhibit 25, opposite). It is also considered one of the most significant factors driving the rate of adoption, as reflected by the average weighted ranking of importance.*

The results of the expert interviews and case studies also support the case for senior management being the most significant driving force behind adopting new technology.

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* The average ranking is calculated by the (# of respondents who ranked the factor first x 1) + (# of respondents who ranked the factor as second x 2) + (# of respondents who ranked the factors as third x 3) all divided by the total # of respondents. It indicates the relative significance of each factor.

Without their support, the adoption of technology could be given low priority in the organization. Senior management's commitment to technology is generally carried through middle management to the workers, and results in a receptive attitude to technology change. In some municipalities, executive management decides which initiatives to pursue in respect to technology. They form the steering committees, educate council and middle management on the benefits of technology, and generally start up and maintain the momentum to adopt it in their organization.

2. Support of Council

Support of council was considered significant by 83% of all respondents, and had a particularly strong response among the medium size municipalities, where 95% put it in the top three significant factors. Council support was the most common factor mentioned by municipalities, and it is important for two main reasons. One, council has control over budget approvals and, particularly in the small and medium sized centres, has a stronger voice in how money is allocated. Two, if council is supportive of technology and does approve monies in this direction, civil servants will feel obligated to fulfill council's directives.

3. Availability of Funds

The third most significant factor, as chosen by 59% of the respondents, was the availability of funds. If there are insufficient discretionary funds in the budget for purchases of technology, then the rate of adoption will be impeded, particularly when technology has to compete with other, more pressing, civic programs/projects.

EXHIBIT 26

FACTORS WHICH IMPEDE THE RATE OF TECHNOLOGY ADOPTION

Factors	Population Size							
	Total		Small		Medium		Large	
	%	Av. Rank	%	Av. Rank	%	Av. Rank	%	Av. Rank
Cost of New Technology	70	1.7	72	1.6	56	2.0	85	2.0
Lack of Funds	69	1.8	68	1.8	66	1.7	85	1.6
Lack of Council Interest	44	2.2	41	2.2	61	2.2	30	2.3
Opposition by Middle Mgmt.	28	1.9	22	2.0	44	1.7	35	2.4
Poor Economic Conditions	26	2.2	32	2.3	12	2.0	25	1.8
Lack of Skills	23	2.4	23	2.4	24	2.2	20	2.8

Note: The per cent indicates the proportion of respondents, by category, which chose a factor as either 1, 2 or 3, in order of significance. The average ranking reflects the relative importance of each factor, as considered by the respondents which put it in the top three. Therefore, the closer the average ranking is to 1.0, the more significance is attached to it by the municipalities who selected it. The closer to 3.0, the less significance is attached.

4. Identifiable Benefits

Identifiable benefits was chosen by 52% of respondents as a significant driving force in adopting new technology, although it was generally not considered the most important factor. Identifiable benefits from technology also relate to the availability of funds and support of council. Council will likely be supportive of technology if benefits can be identified, thus making budget approval easier. An identifiable benefit, however, does not necessarily mean a tangible or quantifiable measure. Many of the benefits stemming from technology are perceived by municipal management in terms of greater productivity, efficiency and so on, but there is no actual measure of the improvement.

5. Other Factors

Other significant factors mentioned by the respondents, which can have a positive impact on the rate of technology adoption, included:

- Specific leadership by management, (13%) which is particularly important at the department level where resource allocation takes place.

- Labour relations, (13%) which can be a positive force if the union/workers are supportive of technology.

- Availability of skills, (6%) which was mentioned by only a few respondents as a factor.

B. FINANCES ARE ONE OF THE MAIN FACTORS IMPEDING THE RATE OF TECHNOLOGY ADOPTION

According to the survey results (see Exhibit 26, opposite), several factors are considered common impediments to the adoption of technology, of which financial reasons are the most important.

1. Finances

The two factors which are most likely to impede the rate at which a municipality adopts technology are really flip sides of the same coin -- affordability. Cost of new technology and lack of funds were chosen by 70% and 69% of respondents, respectively, and both factors were considered to be fairly important in terms of ranking. Medium and large municipalities feel that lack of funds is a more significant factor than the cost of technology, while the reverse was true for small municipalities.

2. Lack of Support by Council

The next most common factor which inhibits the rate of adoption is lack of council interest, particularly in medium-sized municipalities. Just as council support can spur technology adoption, a lack of council interest can impede it.

3. Opposition by Middle Management

Opposition by middle management (managers below department head) to technology was chosen by only 28% of respondents. However, of those who did choose this as a factor, nearly half believe this to be the most important factor in hindering the rate of adoption. It is important to have middle management's support for technology or, failing that, to have their acceptance of it. However, when they oppose its adoption, the municipality faces serious problems in achieving any level of technological proficiency.

From our other research, the two main reasons for middle management to oppose technology is a lack of understanding of the technology and the perception that they are being by-passed in the organization's hierarchy. The first factor can result from insufficient orientation and training, as training is usually aimed directly at the equipment user. The second

factor stems from upper management's new ability with technology to request information directly from a line worker, thus bypassing the normal organizational hierarchy.

4. Economic Factors and Skill Availability

The last two major factors, chosen by approximately one-quarter of respondents, are poor economic conditions and lack of available skills. Poor economic conditions relate back to a municipality's financial ability to purchase technology.

The lack of available skills reflects the high demand for experienced computer specialists, such as programmers, systems analysts and educators, rather than a lack of user skills. The shortage of computer specialists tends to be more pronounced and have a greater impact on the rate of adoption outside the major urban centres, where access to a wide variety of work force skills are more limited. These municipalities must often compete with major centres for employees. Some municipalities in this position have used different approaches to solve their skill requirement problems, such as:

- Hire people for position above their level. In a municipality where competition for jobs is high, some people end-up over-qualified for their position. Municipalities which are trying to attract the appropriate skills offer jobs to people who are slightly under qualified to attract them.

- Another option is to hire people "off the street" and train them for a specific hard-to-fill position. This is especially true in those jobs where there is a high turnover, as employees trained and educated by the organization tend to show more loyalty.

5. Other Factors

Other factors normally thought of as the key factors behind impeding technology adoption cited by the respondents included:

- Lack of employee acceptance (13%). This is usually the case when employees do not receive sufficient preparation and training to be comfortable with the new equipment. They are generally apprehensive and will either avoid using the equipment at all or use it only for the simplest tasks, thus not realizing its full potential.

- Lack of standardization (14%). Some municipalities are operating several incompatible technologies probably purchased by individual departments without a corporate information technology strategy. This impedes the creation of an integrated corporate system, since departments can not communicate with each other through the existing systems.

- Union resistance (10%). This can be a factor when the union feels that the municipality has failed to keep it informed about technology adoption. There have been cases where unions have cited their contractual clauses as reasons why their members do not have to use new technology and they have discouraged their members from using it. But this has not been a major factor.

- Average age of the work force (1%). This was considered a significant factor by only a small proportion of the respondents who thought their workers were too old to change. This was also considered to be the least important factor by those municipalities who chose it.

EXHIBIT 27

ROLE OF GOVERNMENT IN ADOPTING NEW TECHNOLOGY

	Municipal		Provincial		Federal	
	%	Av. Rank	%	Av. Rank	%	Av. Rank
Funding	71	1.8	65	1.6	49	1.8
Information Clearing House	5	1.7	63	1.9	38	2.1
Policy Setting	58	1.7	17	2.1	13	2.2
Implementation Planning	76	1.9	15	2.2	13	2.5
Monitoring Impact of Technology	15	2.7	48	2.4	56	2.4
Training/Re-Training	55	2.4	35	2.0	35	1.9
Research and Development	13	2.4	53	2.1	77	1.6

- Rate of technology change is another reason, identified through research other than the survey, why municipalities put off adopting technology. A regular flow of new development or improvements to the technology causes many municipalities to defer their decision in order to buy the "best version".

There are many factors which can drive or impede that rate of adoption. Success or failure is usually the result of several factors combining and overpowering the opposing forces, rarely is it the result of one single factor. Therein, the most important step to success lies in teamwork. If all levels of employees and council can be convinced of the benefits of technology, the more likely everyone will work together to ensure a smooth and speedy implementation.

C. THERE ARE A NUMBER OF ROLES FOR KEY STAKEHOLDERS IN FACILITATING THE ADOPTION OF NEW TECHNOLOGY

This section discusses the various ways in which government, management, labour and industry associations can assist municipalities in adopting new technology.

1. Different Tiers of Government Have Different Roles

Exhibit 27, opposite, shows the roles which the municipalities surveyed would allocate to municipal, provincial and federal levels of governments. Most respondents indicate that they themselves have a number of significant roles to play in the process of adopting technology, including

- planning the implementation strategy,
- funding,
- policy setting, and
- training.

EXHIBIT 28

ROLES OF MANAGEMENT, LABOUR AND ASSOCIATIONS

	Population Size							
	Total		Small		Medium		Large	
	%	Av. Rank	%	Av. Rank	%	Av. Rank	%	Av. Rank
MANAGEMENT ROLE								
Co-ordination	74	1.8	70	1.8	80	1.6	90	1.8
Educate Council	66	1.9	68	1.9	66	2.0	55	2.3
Union Relations	16	2.5	17	2.5	20	2.5	5	2.0
Keep Up With Developments in Other Municipalities	15	2.3	17	2.2	10	2.8	15	2.3
Keep Up With New Technology	53	1.8	51	1.6	56	2.0	60	1.9
Educate Department Heads	40	2.2	38	2.3	37	2.1	55	1.9
Take Lead Role in Training	35	2.4	40	2.5	29	2.3	20	2.3
LABOUR ROLE								
Work with Management	98	1.3	99	1.3	100	1.3	90	1.3
Educate Membership	95	1.9	94	1.9	95	1.9	100	1.8
Conduct/Sponsor Research	23	2.8	26	2.8	16	2.7	15	3.0
Provide Information To Members	73	2.7	71	2.7	76	2.7	85	2.6
ASSOCIATION ROLE								
Membership Information	81	1.9	82	1.9	83	1.7	72	1.8
Conduct/Sponsor Research	37	2.3	36	2.2	31	2.4	56	2.2
Conduct/Sponsor Seminars	83	2.0	85	2.0	80	2.0	72	2.2
Monitor Developments	73	2.0	73	2.0	77	2.1	67	1.8
Education	25	1.9	21	1.9	29	2.1	33	2.0

Note: The per cent indicates the proportion of respondents, by category, which chose a factor as either 1, 2 or 3, in order of significance. The average ranking reflects the relative importance of each factor, as considered by the respondents. Therefore, the closer the average ranking is to 1.0 the more significance is attached to it by the municipalities who selected it, the closer to 3.0 the less significance is attached.

Few municipalities think that the federal or provincial governments have a role in policy setting or planning. The areas where respondents think senior governments should concentrate are:

- research and development,
- funding,
- acting as an information clearing house, and
- monitoring the impacts of technology.

2. <u>The Roles for Management, Labour and Industry Associations Revolve around Co-ordination, Co-operation and Information</u>

The most common and important role management should have in facilitating the adoption of new technology is acting as a co-ordinator between council, middle management and workers to ensure that everyone is heading in the agreed upon direction. Other key roles seen for management, as indicated by the respondents (see Exhibit 28, opposite), are educating both elected officials and middle management, as well as keeping up with new developments in technology relative to municipalities.

The two most important roles for labour are working with management and educating their membership. However, this is strictly management's point of view as labour representatives did not participate in the survey.

The key role for industry and professional associations is acting as an information broker. This can be accomplished through on-going membership information provided in newsletters or bulletins, or through organizing seminars on important issues.

CHAPTER VII

MUNICIPAL EXPERIENCE HIGHLIGHTS THE NEED FOR STRATEGIC PLANNING OF TECHNOLOGY IMPLEMENTATION

VII. MUNICIPAL EXPERIENCE HIGHLIGHTS THE NEED FOR STRATEGIC PLANNING OF TECHNOLOGY IMPLEMENTATION

Many municipalities understand the importance of strategic planning in articulating the short and long-term goals of the organization, and defining how these goals are going to be achieved. Technology is one of the tools municipalities expect to use in reaching their goals. A strategy for technology use should flow from the municipality's business strategy and should be developed to support its business objectives.

This chapter, based on the "best practice" experience of Canadian municipalities:

- highlights some of the problems encountered in the implementation of information technology,
- discusses why planning for technology is important, describes the planning and implementation processes, and
- discusses some of the critical issues related to training during implementation.

A. MOST PROBLEMS ARISING FROM IMPLEMENTING NEW TECHNOLOGY CAN BE READILY DEALT WITH

Some municipalities have experienced serious problems arising from implementing inappropriate technology. Some examples include:

- hardware with insufficient capacity required replacement sooner than anticipated,
- customizing packaged software cost more than developing the software,

- failure of new system, attributed to insufficient testing, caused significant delay in critical processing,

- inadequate needs analysis and planning caused significant delays in implementation, and

- potential benefits were jeopardized by employees resisting new technology by retaining manual systems or using only the basic functions of the new system.

Most municipalities feel that problems arising from implementation of technology can be solved, or at least their severity lessened, by carefully planning each step of the implementation process. The following highlights some of the key factors in ensuring a successful information technology implementation, as determined by the municipalities.

B. PLANNING IS A KEY STEP IN THE IMPLEMENTATION OF TECHNOLOGY

Most municipalities recognize that the most critical step of a successful implementation of technology is planning. As part of a strategic planning exercise, a municipality can assess its strengths and its needs, as well as determine the necessary strategy to meet those needs. This type of planning has resulted in objective-driven decisions which have remained valid for a longer period of time. The effect of technology on the organization and its people has been found to be significant and too costly for experimentation.

When planning for the implementation of technology, the municipality raises a number of questions which need to be addressed before resources are committed. Some areas discussed prior to the acquisition of technology were:

- Business Information Needs: What information do we need to run our business? How do we get this information? How will we store and retrieve this information?

- Technology: What type of technology do we need to support and provide this information? Is technology the only solution?

- Setting Priorities: Where should the technology be applied? Where can the largest gains be realized?

- Finances: How will technology affect the budget? Can we stage the implementation? Do the strategic benefits justify the completion of the implementation?

- Human Resources: What resources are required for the implementation? Do we have the necessary skill mix? How much training will be required? Can we spare the resources for systems development and software, or will we have to contract for outside services?

When the municipality addresses these issues, it will be better prepared to deal with problems if and when they arise. Municipalities found that planning made them less vulnerable to more costly "patch work" solutions. They also found they did a more thorough examination of opportunities for use of information technology, and were able to provide a more cohesive technical environment.

C. MOST MUNICIPALITIES TAKE A CENTRALIZED APPROACH TO THE TECHNOLOGY PLANNING AND IMPLEMENTATION PROCESSES

Once the information technology strategy is defined, the successful municipality develops comprehensive, well thought out strategic and tactical implementation plans to get the technology operational.

Without this plan, many municipalities experienced problems during their systems delivery process and had to create their strategy as they went along, learning from their mistakes.

The municipal experts identified some key reasons for planning the implementation of technology, namely:

- implementation remained in line with the municipality's business goals and objectives,
- priorities were set for applications to realize the greatest overall gains,
- implementation was synchronized across all departments, based on application priorities, and
- compatible hardware was implemented across departments.

To ensure a successful implementation plan, and to coordinate the implementation effort, over half of the municipalities plan for technology in a centralized function, rather than at the departmental level. This approach is even more common in the medium and large size municipalities. As they move toward integrated corporate information systems, the central planning allows the executive management to have more control over the planning process.

Although the centralized planning process is conducted at the senior/executive management level, it is not exclusively a "top down" approach. Information technology needs can arise from any level. Final decisions are made at the senior levels, using input gathered from workers and middle managers from the various departments. Workers identified better ways to do their jobs, and managers recommended staffing cost containment through the

implementation of technology. When the need for technology is determined at senior levels of management, a task force or steering committee, representing various departments, functions and levels of employees, is often created to assess the needs and make recommendations to senior management. The computer/systems group acts as a technical advisor to the task force; its members analyze the technology requests from the various departments, and recommend the best way to achieve them.

When all the needs and their strategic justification are identified, the task force and executive management go through the strategic planning process to determine what actions are feasible.

When the plans are completed, the decisions are communicated to the organization, including the unions, and the individual departments, with technical support from the management information systems (MIS) group, implement the recommended solutions.

Municipalities have found that successful implementation depends on a good systems delivery plan which involves the users throughout the process, and provides strong or thorough procedures for detailed needs assessment, and packaged software evaluation and testing. To avoid lengthy implementations, good project management techniques were used. These include breaking the projects into implementation stages, if necessary, planning the project, using the work breakdown structure technique for estimating, and managing it, using problem and change management control procedures. Most municipalities believe that careful planning and management ensures successful implementations.

D. ORIENTATION AND TRAINING ARE CRITICAL FACTORS FOR A SMOOTH IMPLEMENTATION

A key success factor arising from the expert interviews, case studies and discussion groups, was the role of orientation and

EXHIBIT 29

TYPE AND QUANTITY OF TRAINING PROVIDED
(per cent)

	Total	Population		
		Small	Medium	Large
TYPE OF TRAINING				
Informal	80%	81%	79%	75%
Formal	66	59	74	90
DAYS OF TRAINING PROVIDED				
Under 1 day	3	4	3	0
1 to 5 days	64	67	62	53
6 to 10 days	10	8	14	12
Over 10 days	6	6	5	6
Varies as Required	16	15	11	24

training in ensuring a smooth transition to new technology. Overall orientation to the concept of technology and what it means to the municipality, and training on the technology that the worker is expected to use, are critical.

The orientation should introduce employees to the new technology, explain why it is being implemented, what they can expect to happen, and reassure them and ask for their input. Municipalities have found that this process allows the employee to "buy into" the idea of technology and become an onside supporter. Employees who have been successfully oriented are more responsive to training programs and are eager to use the new technology. Without this orientation they are typically more suspicious and apprehensive towards it.

Orientation allays the fear of technology. However, it is not sufficient on its own. Municipalities found that employees need upfront training to ensure successful implementation. Plunking the hardware onto the employees' desks, telling them when the training session is scheduled, and asking them to see what they can accomplish on their own prior to the training session, only alienates them.

The following summarizes our findings relative to the municipalities' training offerings, and their experience with the training of older workers.

1. Most Municipalities Use a Combination of Formal and Informal Training

   Approximately two-thirds of the municipalities provide formal training, which involves classroom training by a professional educator, either in-house or outside the municipality. See Exhibit 29, opposite. Approximately 80% of the municipalities provide formal training which involves on the job learning, with assistance from a supervisor or co-worker. Although most

municipalities offer a combination of formal and informal training, a number of municipalities depend exclusively on informal methods.

From the case studies and discussion groups we found that employees are not completely comfortable with receiving informal training. This may be because employees do not want to admit their lack of knowledge to their supervisor or co-workers, or are feeling pressured to maintain their workload while learning a new system.

We also found that there was a fair amount of displeasure with "cluster system" training. This is when one employee from a group is chosen to receive formal training and then is expected to train his/her group (cluster) members. The problems revolve around showing favouritism to the employee receiving the formal training which causes resentment among co-workers. Also, the cluster leader is not a trained educator, and thus cannot bring the full value of the training back to the group. However, employees do support informal training to enhance the formal sessions.

2. <u>The Time Allocated for Training Is Relatively Modest</u>

The survey showed that one to five training days were most commonly allocated, with some municipalities allocating training time, as required. The allocation seems appropriate, since training focuses on various software applications for word processing, spreadsheet analysis and data base management, which are typically user friendly and achieving basic operating skills does not require extensive training. It is felt that municipalities could realize higher levels of efficiency if their employees become more familiar with the advanced functions offered by these programs. Due to the demand for even the basic user skills, many municipalities have

EXHIBIT 30

TRAINING PROBLEMS BY AGE GROUP
(per cent)

		Population		
	Total	Small	Medium	Large
PROBLEMS IN THE PAST				
Under 25 years	3%	4%	0%	0%
25 to 44 years	10	8	13	15
45 to 54 years	54	52	63	46
55+ years	68	63	71	92
PROBLEMS IN THE FUTURE				
Under 25 years	4%	6%	0%	0%
25 to 44 years	11	13	8	8
45 to 54 years	47	47	50	33
55+ years	71	66	76	100

not been able to upgrade the training to include advanced functions; therefore, employees are left to their own devices to improve on their basic skills. The downside of self-education is that workers who are uncomfortable with technology will stick to their basic knowledge and, even if the technology has the capacity for more advanced functions, they may not acknowledge those capabilities for fear of appearing stupid or failing to perform them correctly.

3. Middle Management had Different Training Needs

It was pointed out in various research phases that middle management can, at times, impede the adoption rate of technology. It is felt that they need to understand the role of technology in the municipality, what technology can do for their area, and how it will enable them to better integrate with other areas. Only a few municipalities provide this type of training. Most training is offered only to the actual users of the technology, or the supporting technical staff. Supervisory or management technology training will help to expedite the implementation progress.

4. Training for Older Workers can be a Special Challenge

Most municipalities have experienced training problems with workers over the age of 45 years, (see Exhibit 30, opposite) and recognize the need for special training. These people have worked the longest without technology and are reluctant to change their methods of doing their jobs. Although it is not an unexpected problem, in the future, more municipalities will need to address this issue as today's 45 to 54 year olds move into the 55+ group.

E. MUNICIPAL "BEST PRACTICE" EMPHASIZES STRATEGIC PLANNING

The critical success factors for smooth implementation of information technology, as indicated by municipalities, are summarized as follows:

- Develop and maintain a long-term strategic plan for the municipality, including a strategic information technology plan.

- Carry out a detailed needs assessment:

  - involve workers, middle management and senior management,

  - create a technology task force to assess needs,

  - work with the computer systems or management information systems group as technical advisors,

  - determine needs which can be met, and define projects and set priorities for implementation.

- Keep all staff, including unions, informed of new developments,

- Ensure good systems delivery practices, including appropriate project management and user involvement throughout the development process.

- Provide appropriate orientation and training courses to familiarize all levels of staff with the concept of technology and what it means to their jobs, and specific technology training at both the awareness and "hands on" training levels.

The above has contributed significantly to successful information technology implementations in many municipalities.

CHAPTER VIII

CONCLUSION

VIII. CONCLUSION

Municipalities have turned to technology in their search to become more productive and efficient, and to have more control over their expenditures. Technology's perceived role in municipalities is to allow them to accomplish more, with fewer resources. It is seen as an alternative to hiring new employees now, and in the future.

The key to facilitating adoption of new technology is support by senior management. Those municipalities where senior managers have a commitment to technology find that their adoption rate is faster, and there are fewer problems with implementation. The greatest impediment to adopting technology is the cost and the municipality's ability to allocate funds for technology. However, as the price of technology continues to decrease and it becomes easier to use, and as more municipal-specific software becomes available, the rate of adoption will increase.

The impact on employment, overall, is not considered significant. Technology is not expected to result in declines in employment, but is expected to shield the municipality from the need to hire new employees. There is near unanimity that technology is and will increase the skill level and the job scope of the workers affected, thus broadening the employees' horizons.

Workers are considered to be generally receptive to the adoption of new technology. However, middle management is perceived by some municipalities as impeding the rate of adoption.

There has not been a significant amount of attention paid to the implications of technology on the effective organization of work. Most municipalities feel that it is too early in the technology adoption phase to re-organize work processes. However, this is a function they would like to examine in the future.

The critical success factors for smooth implementation are widely agreed upon, although not widely followed. The key factors are a needs assessment, careful planning, communication with staff, proper level of training, and sufficient time to test new systems.

Many municipalities do not have a formal implementation policy. They have implemented technology without fully planning the process. Most did not experience major problems. However, they do acknowledge that, with a proper strategy, many minor frustrations could have been avoided.

APPENDIX I

LITERATURE REVIEW - LIST OF INFORMATION SOURCES AND SUMMARY

CONTACTS MADE

Government Departments/Libraries

- Provincial and Municipal Libraries in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Nova Scotia, New Brunswick.
- Labour Canada.
- Ontario Ministry of Intergovernmental Affairs.
- Public Works Canada, Library Services.
- Saskatchewan Urban Affairs (Regina).
- Metropolitan Toronto Reference Library.
- Municipal Reference Library (Toronto).
- Office of Technology Assessment (U.S.).

University Public Administration Departments/Libraries

- Carleton University.
- Queen's University.
- University of Toronto.
- University of Alberta.

Relevant Associations

- Canadian Union of Public Employees.
- Economic Council of Canada.
- Institute for Public Administration.
- Institute for Research on Public Policy.
- Canadian Association of Municipal Administrators.
- Intergovernmental Committee on Urban and Regional Research.
- International City Management Association (U.S.).
- Public Technology Institute (U.S.).
- Urban Information Systems, Public Policy Research Association, University of California, Irvine (U.S.).
- Urban and Regional Information Systems Association.
- Canadian Institute of Planners.
- Tri-Committee on Utilization of Computers in Public Works.

SUMMARY OF FINDINGS

The literature reviewed falls into three main categories.

1. Technology and its impact on occupations and the work environment, not specific to municipalities. This work was mainly conducted by government agencies, academics and consultants.

   - The work in this area covers the following topics related to technology:

     - job loss,
     - employee needs,
     - strategies to deal with technology,
     - implications for special groups, and
     - the relocation of occupations.

2. Labour-sponsored research which studies the impact of technology.

   - Much of this research is directly related to municipal governments focussing on.

     - job content,
     - the role of the employee,
     - a union role in implementation,
     - employee satisfaction, and
     - matters of health and safety.

3. The third major area deals with management and some of the technical aspects of technology.

   - Studies in this area were concerned with:

     - the implications of specific technologies,
     - planning for technology,
     - needs assessment,
     - implementation procedures,
     - management systems, and
     - impacts on the organization.

   - Other publications/articles included:

     - directories on computer applications,
     - manuals and workbooks providing guidelines,
     - technical descriptions of capabilities, and
     - overviews of specific technologies and their applications.

4. The literature does not provide a comprehensive analysis of the impact of technology on the municipal sector in terms of:

- overall employment,
- specific occupations,
- an overview of technologies,
- challenges and opportunities,
- costs and benefits, and
- management's perspective.

RESULTS OF LITERATURE REVIEWED

- Literature dealing with the management and technical aspects of new technology reinforces the findings of our interviews with experts, that:
  - the attitude toward technology is positive, and
  - although difficulties in implementing technology are acknowledged, the long-term benefits are stressed.
- The literature from the labour perspective is less supportive of new technology than other surveyed material:
  - it is more concerned with the impact on employees than on the organization,
  - it voices the fear that technology may jeopardize job security,
  - increasingly, it focusses on health and safety implications, and the relative lack of labour involvement in the planning process, and
  - it questions management's assertion that job satisfaction will increase with the adoption of new technology.

APPENDIX II

EXPERT INTERVIEW CONTACT LIST AND SUMMARY OF FINDINGS

EXPERT INTERVIEW
CONTACT LIST

Maritimes	J. Hawkins	- Municipal Affairs, New Brunswick
	B. Smith	- City of Halifax, Nova Scotia
	H. LeBlanc	- Provincial/Municipal Council, New Brunswick
	G. Havourstock	- Municipal Affairs, Nova Scotia
Quebec	J. Almeras	- City Manager, Quebec City
	M. Frappier-Desrosier	- Department of Manpower & Labour
Ontario	D. McGeown	- Ontario Management Board
	J. Hindson	- City of Hamilton
	D. Steen	- Ministry of Municipal Affairs, Technology Branch
	A. Stevenson	- City of Toronto
Prairies	I. Wright	- Alberta Municipal Affairs
	T. McKay	- City of St. Albert (former CAO)
	D. Innes	- Deputy Minister, Municipal Affairs, Saskatchewan
British Columbia and Northwest Territories	B. Walisser	- Municipal Affairs, British Columbia
	J. Fleming	- Burnaby
	R. Taylor	- Union of B.C. Municipalities
	F. Nash	- Nanaimo
	R. Wiens	- Surrey
	M. McGrath	- Yellowknife
General	C. Toregas	- International City Managers Association/Public Technology Institute (U.S.)
	E. Pezanowski	- Urban and Regional Business Information Systems (U.S.)
	M. Ismail	- Tri-Committee on Computerization in Public Works (Canada)

SUMMARY OF EXPERT INTERVIEWS

Challenges Facing Municipalities in Terms of Providing Service to the Public

- Increase the level of service demanded by the public.
- Provide more information without increased costs.
- Cope with growth in population and infrastructure.
- Respond to static or decreasing employment levels.
- Be financially responsible.

In summary, the theme dominant in the responses is that municipalities have to provide more services and information with the same or fewer resources.

The Role of Technology in Meeting Those Challenges

- Increase productivity.
- Increase efficiency.
- Limit the need for future hiring.
- Provide systems for accountability.
- Make new services feasible.

Technology will assist municipalities in facing new challenges and increased demands by allowing existing resources to be used more effectively.

Technology in the Scope of Municipal Operations

- There is a movement from centralized systems.
- The trend is toward a centralized database with de-centralized applications.
- Technology is implemented on a priority basis, by department, since new applications are commonly function-specific.

Technology use is moving from centralized, general functions to a de-centralized, function-specific approach which allows all departments access to information.

Technologies Currently in Place at the Municipal Level and Future Trends

- The level of technology adoption varies by municipality.
- Most medium to large municipalities have computerized the accounting/financial function.
- Office automation, consisting mainly of word processing and micro-computer applications, is in wide use.
- More advanced office automation includes PC access to mainframe, LAN's, electronic mail, fibre optics and voice/data transmission.

- The next areas to be automated will be the public works and protective services departments.

- The future trend in technology in large and medium municipalities will be toward an integrated, cross-departmental, geo-base system.

Impact of Technology on Employment

The following table illustrates the impact on employment as indicated by the respondents.

	Increase (Positive)	Decrease (Negative)	No Impact
Current Employment Levels			•
Future Employment Levels		•	
Skill Levels	•		
Job Content	•		
Contracting Out			•
Part-time Work			•
Employment Equity			•

Justification For Expenditure on New Technology

- Cost savings.
- Efficiency/productivity improvement.
- Better access to more information.
- Improved service delivery.
- Status relative to that of other municipalities.

Expenditure on new technology is justified in terms of both the tangible or measurable benefits, and the intangible or perceived benefits, to be gained.

Factors Which Assist the Adoption Rate of New Technologies

- Progressive corporate self-image.
- Committed senior management.
- Strong leadership by an administrator.
- Supportive council.
- Detailed plans for implementation.
- Good management/labour relations.
- Availability of funds.

Factors which assist the adoption rate of new technologies are largely based on management's role and leadership abilities.

Factors Which Impede the Adoption Rate of New Technologies

- Non-supportive council.
- Lack of funds.
- Resistance of labour.
- Poor management systems.

The greatest impediment to the adoption of new technologies, particularly in small municipalities, is the lack of council support.

Critical Steps to Ensure a Smooth Implementation

- Determine needs and priorities.
- Form Steering Committee or Task Force composed of council members, management and labour.
- Examine systems in other municipalities.
- Educate the users on the role of technology.
- Provide technical training.

Clearly, the master key to smooth implementation is planning.

Availability of Skills Versus Demand, As Determined by New Technology

- Municipal government is generally not free to recruit skilled people from the general workforce, because of:
  - hiring constraints, and
  - with smaller municipalities, an ability to offer attractive compensation.
- In the initial phases of technology adoption, skill shortages develop as employees are being trained.
- No significant skill shortages are perceived as education and training, plus selective hiring, will deal with skill shortages within the municipal organization.
  - Larger municipalities are in a better financial position to attract the best candidates, and provide them with adequate training, than are small municipalities.
- Skill surpluses or occupations which become redundant are dealt with through:
  - attrition,
  - early retirement,
  - job re-positioning, and
  - training/re-training.

The Relationship Between Municipalities and the Education Sector

- Varies by province.
- New Brunswick municipalities have a program, organized through the provincial government, and administered by the colleges.
- In other municipalities, provincial associations have organized programs through the education sector.
- Few municipalities have a formal relationship with the education sector.

Role of Various Stakeholders

The following table illustrates the roles which apply to various stakeholders in facilitating the adoption of technology.

	Federal Government	Provincial Government	Municipal Government	Associations
Information Transfer/Clearing House		•	•	•
Research and Development	•	•		
Monitor Impact		•		•
Funding	•	•		
Policy Setting	•	•	•	
Advisory Service		•		•
Training/Education	•	•	•	•

APPENDIX III

SUMMARY OF CASE STUDY FINDINGS

I. PROFILE OF CASE STUDY MUNICIPALITIES

Case Study Municipalities

- Saint John, New Brunswick
- Laval, Quebec
- Mississauga, Ontario
- St. Albert, Alberta
- Burnaby, British Columbia

A. TECHNOLOGY CURRENTLY IN PLACE

- All municipalities have a main frame computer for various finance applications, such as A/R, A/P, G/L, payroll, utility billings, etc.

- Some degree of office automation is also in place in all the municipalities, ranging from basic word processing to nearly complete electronic offices.

- The third area where applications of technology are common is engineering/public works, where the degree of technology implemented varies considerably.

  - Common applications are unit costing, computer-aided design and scheduling software.

  - All the municipalities are at some stage of planning for, or implementing, a geo-based information system.

B. THE FUTURE OF TECHNOLOGY

- The focus of all the case study municipalities is to create a corporate management information system.

- The core of most of these systems will be a geo-based information data base which will be shared by all departments.

II. PLANNING AND IMPLEMENTATION

A. PLANNING FOR TECHNOLOGY

- Most municipalities did not plan for technology until it was realized that different departments were running various applications which were not necessarily compatible or cost-efficient.

  - Early acquisitions of technology were done on a year-to-year basis through the budget cycle.

- To control technology implementation, municipalities form Steering Committees or Task Forces and some hire outside consultants to carry out a needs assessment and set priorities for acquisitions.

- Some municipalities are working on, or have completed, long-term planning for the adoption of technology. These plans are usually incorporated with their long-term strategic and capital expenditure plans.

B. ORGANIZING FOR TECHNOLOGY

- In most cases, technology was originally located in the finance and engineering departments, each pursuing those applications relevant to its own needs.

- Requests from other departments to acquire new technology went through the Director of Finance since the systems/technology group was part of that department.

- Most of the case-study municipalities eventually determined that this was not an equitable arrangement and removed the systems group from Finance. Information technology, or systems, was either made into a separate department or became part of management services.

- In other municipalities where systems remain part of Finance, Steering Committees are created with representation from several departments to control the acquisition of new technology.

C. IMPLEMENTATION STRATEGY

- Not all municipalities have a formal implementation strategy:

  - Some are in the pilot test phase of technology implementation and, therefore, implement only where success is probable (and high profile).

  - Others are working on an implementation strategy for subsequent purchases of technology.

- Key features of any implementation strategy used included:

  - First and foremost, planning for technology well in advance of implementation.

  - Running orientation sessions with the staff to prepare them for the new technology.

- Keeping the union up-to-date.

- Creating a role for the users, so that they have some input into what is required.

- Extensive testing of a new system while the old system is still running.

D. DIFFICULTIES ENCOUNTERED IN THE PROCESS OF INTRODUCING NEW TECHNOLOGY

- Some municipalities experienced minor to severe problems with their hardware and/or software.

- Some employees initially resisted the introduction of technology, though most were eventually won over.

- Other problems stemmed from:

  - the lack of in-house technical support,

  - an insufficient time to carry out implementation, and

  - the development stage of a system requiring more time and money than expected.

III. IMPETUS AND CONSTRAINTS TO CHANGE

A. FACTORS WHICH DETERMINE THE NEED FOR NEW TECHNOLOGY

- The need for technology originates at many levels throughout a municipality:

  - requests come from individuals who realize that technology can improve their work, and

  - top management may decide that, in order to be more efficient or competitive, new technology will be required.

- Once the decision is made or the need for technology realized, then the municipality starts the planning process to incorporate new technology.

B. FACTORS WHICH DRIVE THE RATE OF ADOPTION

- The critical factor which drives the rate of adoption is the support of senior management. The adoption of technology depends on the level of commitment by senior management, since they:

- present the case for technology to council for approval,

- allocate time and money out of departmental budgets to investigate, develop and test new systems, and

- encourage their staff to accept and learn about technology.

- Other factors which drive the rate of adoption are:

  - the enthusiasm of key workers,
  - council's support, and
  - pre-planning for technology.

C. FACTORS WHICH IMPEDE THE ADOPTION RATE OF NEW TECHNOLOGY

- Lack of support by senior management, at the executive or department level.

- Lack of available funding.

- Other factors which impede the adoption rate of new technology are:

  - employee resistance, usually due to a lack of information,

  - insufficient training, and

  - problems with software/hardware.

IV. IMPACTS OF TECHNOLOGY

A. IMPACT ON EMPLOYMENT LEVEL

- Technology does not eliminate jobs. Instead, it allows the municipality to accomplish more work and provide more services with the same number of staff.

- At worst, technology does away with some of the need for future hiring.

- At best, technology creates new employment because:

  - the conversion process from manual systems is labour-intensive, and

- as information becomes more cost-effective, computers have the potential to create new projects, some of which will require additional employees.

B. IMPACT BY OCCUPATION

- Depending on the application of technology, various occupations can be affected. Since the most common technologies used in municipalities deal with finance or office automation, secretaries, clerks and accounting staff in these departments are those most affected.

- Technology has a more direct impact on junior level occupations, as employees at that level experience changes in job function and execution.

- The impact on managers varies from very little to a significant amount, especially where technology allows them a more "hands on" approach to their work.

C. IMPACT ON SKILL LEVELS

- There is virtually no impact on skill levels in some job functions, i.e., a clerk who now has to input data rather than record it manually.

- In some jobs, however, technology requires an increase in analytical, communication and cognitive skills, i.e., a secretary who acts as an administrative assistant or a senior level clerk who now analyzes data and produces reports.

- Most municipalities now require higher skill levels from newly hired personnel than from current employees in similar positions.

D. IMPACT ON TRAINING

- The need for training, particularly in the short term, is significant.

  - Most municipalities are not able to keep up with the immediate demand for training.

- Current employees require training and support with new technology.

  - Most new hires need some training, depending on the hardware/systems used by the municipality.

- Initial training is usually given by the vendors; and the remainder is done internally by the municipality and/or the employees themselves. Such methods may include:

  - setting up an in-house training centre,
  - conducting informal user groups,
  - learning from fellow co-workers, and
  - training oneself through tapes and manuals.

E. IMPACT ON ORGANIZATION OF WORK

- The impact on the organization of work is poorly documented by most municipalities because the technology is still fairly new and not fully implemented.

  - Most continue working as they did before the new technology was implemented.

- Some examples of changes are:

  - Managers who, having access to word processing units, now type their own drafts, and secretaries do the formatting and corrections.

  - Reports for Council are not re-typed by the clerk's office; they are electronically transmitted and printed.

F. HEALTH AND SAFETY IMPLICATIONS

- Some municipalities are very conscientious about the health and safety implications of technology. They:

  - provide ergonomic furniture,
  - supply proper lighting,
  - provide anti-glare screens, and
  - have a policy to protect pregnant workers.

- Other municipalities are much less concerned with health and safety implications.

APPENDIX IV

DETAILED DESCRIPTION OF SURVEY METHODOLOGY

DETAILED DESCRIPTION OF SURVEY METHODOLOGY

The sample frame consisted of a total of 640 municipalities, each with more than 5,000 people. Although municipalities with a population over 5,000 comprise only 15% of all municipalities, they account for a major share of both municipal employment and the total Canadian population.

Nearly 61% of the large, 56% of the medium, and nearly 60% of the small municipalities replied to the questionnaire by the cut-off date, providing a fair representation, by size, of municipal organizations.

The analysis of survey results in the report includes breakdowns by size of municipality. There were no significant findings on a regional basis, and the confidence level was not as high as for the aggregate data; therefore, analysis by region is not included.

The questionnaire was sent to the Chief Administrative Office or Clerk Treasurer for completion. It addressed the research issues, as identified through the expert interviews and literature review.

To ensure a high rate of response, reminder letters were mailed out and, in the third week, a phone call was made to all the medium and large municipalities.

APPENDIX V

SUMMARY OF DISCUSSION GROUPS

Background

- We conducted three discussion groups, two with management and one with workers.

  - Halifax, Nova Scotia - Management
  - Regina, Saskatchewan - Workers
  - Ottawa, Ontario - Management

- The purpose of the discussion groups was to gain insight into how technology is perceived by different municipal employee groups such as workers and managers.

Profile of Participants

- Department managers, middle to senior levels.

- Departments involved:

  - Engineering/Public Works,
  - Finance/Treasury,
  - Personnel/Payroll,
  - Social Services,
  - Police.

Workers

- Clerks' managers, middle to senior levels.

- Departments involved:

  - Management Services,
  - Payroll,
  - Fire Department,
  - Public Works,
  - Personnel,
  - Systems,
  - Clerks.

Impacts of Technology on Human Resources

- Both workers and management agreed that the overall impact of technology on employees was positive in terms of:

  - skills development, and
  - job enhancement.

- Impact on total employment varied, but all agreed that there was no direct job loss.

- Age was a factor in accepting technology, with older workers being more reluctant.

- Impact by level/occupation varied according to the function performed.

Other Impacts of Technology

- Managers feel that new technology allows for significant internal improvements, but gives little direct benefit to the public.

- Workers believe that technology helps them to give more efficient and accurate service to the public.

- Managers tend not to be concerned with health and safety issues.

- Workers, on the other hand, are concerned with the lack of attention given to health and safety issues.

- Managers see very little change in the organization of work, whereas workers feel that more responsibility has been placed on them.

Training for Technology

- Managers felt that the internal training program was sufficient.

- Workers thought that their training was inadequate:

  - not enough time was allocated to learning a system,
  - there was no formal training program,
  - in-house support was poor, and
  - there was lack of information and preparation for the new system.

Role in Adopting New Technology

- Most of the managers felt they were in some way responsible for obtaining the technology in their departments.

- Workers believed they had no input in this area.